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Machinery Cannot Compete With the "Nowgunnies" or Professional Stone Carriers of India. They Work for from 10 to 16 Cents per Ten-Hour Day.

THE MARI-KANAVÈ DAM IN SOUTHERN INDIA.—[See page 156.]

SCIENTIFIC AMERICAN

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NEW YORK, SATURDAY, SEPTEMBER 5, 1908.

The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

ORNAMENTAL ELEVATED STRUCTURES.

It would seem that at last the question of the ornamental appearance of such elevated structures as may be built in this city is to receive the attention which its really great importance demands; for we understand that the civic authorities have taken a decided stand upon this too-long-neglected subject. The first attempt to give such architectural beauty as is possible to an elevated railway will be made in connection with the elevated road to be built through Flatbush Avenue extension, from Fulton Street, Brooklyn, to and across the new Manhattan Bridge. It cannot be denied that an elevated railway, of the type that has been constructed so freely on Manhattan Island and in Brooklyn, is a decidedly unsightly structure. For the matter of that, it may be said that any elevated railway is unsightly; but the structures of this type to be found in this and other leading cities of the East are rendered particularly so by the fact that their proportions and lines were drawn with a rigid regard to utility, that is to say, to the engineering requirements of expeditious and cheap construction and erection. The rectangular outlines are stiff, and wearisome in their endless monotony; while, as for the stations, the less said about their ornamental features the better.

That the inevitable harshness of the lines of such construction may be softened, and its monotony varied by judiciously applying a limited amount of ornamentation, has been proved in the case of some European elevated railways, and notably those in the city of Berlin. In the elevated roads of that city, graceful curves unite the vertical supporting members with the horizontal girders, and dome-roofed stations of a simple design are made to harmonize with the general treatment of the roadway itself. Fortunately, the occasions on which short stretches of elevated structure must be built in this city will be few and far between; and it is gratifying to learn that such as are put up will have some pretensions to that architectural treatment of which the existing roads are so commonly barren.

EXPERIMENTAL DAMS AT THE PANAMA CANAL.

Judging from the extended and elaborate series of experimental tests which are being made in connection with the great Gatun Dam on the line of the Panama Canal, this structure, as completed, will be of a character to command the confidence even of its most skeptical opponents. When the proposal was first made to turn the valley of the Chagres into a huge lake, containing over 100 square miles of water surface, and to hold this inland sea back by an earthen dam, built upon a subsoil consisting of alluvial material, the scheme was immediately subjected to the most bitter criticism by many engineers and contractors of wide experience and reputation. The dangers of excessive seepage through the dam itself, or of escape of the water through pervious strata in the bed of the valley underneath the dam, which were dwelt upon so earnestly by the critics, are being met and answered by the series of investigations which has been carried on for the past eighteen months and is still actively in progress. Two experimental dams have been built, both on a scale of 1 to 12, each being 85 inches high to the high-water line, as against a height of 85 feet of the dam itself. In the first dam the material was deposited by pumping, the work commencing at the downstream toe, and being carried on until the upstream face was finished, with the result that the finest particles of material, most impervious to water, were deposited along the upstream face. A head of water of 85 inches was then applied at the upstream face and the rate of seepage, as noted, proved to be satisfactory beyond the expectations of the engineers. In the second experimental dam the material will be pumped into place and deposited simultaneously from both the downstream and the upstream faces, with the result that a larger percentage of the finer material will be deposited as an impervious core in the center of the dam. When a similar head of 85 inches of water is applied, it will be possible to determine the relative rate of seepage of the two types. Hitherto, all the data obtained in the experimental work, not merely in these two dams, but in the bore holes, test pits, tank tests, etc., have given results superior to those predicted when this type of dam was first proposed.

THE STREET NOISE CRUSADE AND THE RAIL JOINT.

The present crusade against unnecessary street noises is one of the most commendable movements of reform of recent years. There is no denying that the average big city during the hours of business life is a perfect pandemonium of discordant sounds; and probably there is no city in the country where the clamor is more persistent and penetrating than in New York. Of all the contributory agents, undoubtedly the most distressing are the various railroads, both surface and elevated, and the major part of the racket and din which they produce is attributable to the passage of the wheels of traffic over the rail joints. In spite of the amount of thought and money which have been expended on the problem of providing a joint which will hold up the rail ends in true level, it has to be confessed that no such joint has been provided that is satisfactory. It is only a question of time when the splice bolts begin to slacken, the splice bars to wear at their upper and lower edges, and the rail ends to sag under the passage of the heavily-loaded cars. When this condition has been brought about in ever so slight a degree, the rail end which the rolling wheels are about to leave is depressed more or less below the abutting rail end ahead, with the result that there is a distinct and very heavy blow given by the wheel as it climbs this rail, and the sound of a loud metallic blow is produced, the intensity of which increases with the looseness of the joint. Similar conditions exist at crossings and switches, and at every point, indeed, where the continuity of the rails is broken. The defect may be remedied or mitigated to a certain extent by careful maintenance; that is, by constant inspection of the joints and continual tightening up of the bolts to take up as far as possible the wear. On steam railroads where the rails stand entirely exposed to view this can be done; and on first-class roads with heavy rails and a thorough system of inspection the rail-joint problem has been so far solved that the jar and noise occasioned by low joints have been fairly well eliminated. On street railroads, however, such as we have in New York city, the joints after they have been screwed up to a snug bearing, are covered up by stone or asphalt pavement, so completely that any further adjustment of them is impossible, and the loosening of the joints and battering down of the rail ends is only a question of time and of the density and weight of the traffic. Several years ago when the new heavy steel rails weighing 110 pounds to the yard (the heaviest steel rails at that time in existence) were laid down upon the Broadway line, we predicted that, in spite of the fact that specially heavy splices were provided, there would be a steady depreciation of these joints, due to the fact that they were entirely asphalted over and inclosed beyond any possibility of upkeep. The prediction has come true, and every year the clash and clang of the joints has increased until it threatens to become a positive nuisance.

Probably no one is more alive to this evil or more anxious to find a remedy than the engineers of the railroad company itself. Practically the only way in which a permanently silent joint could be secured would be by welding the ends of the rails together, thus providing a practically continuous member. That this method would serve largely to render the track silent has been proved in the Borough of Brooklyn, where, some years ago, on several miles of road the bolted splices were removed and solid splices were electrically welded on, making the rails practically continuous. On the stretches of track where this was done the results were immediate; the track riding so smoothly that neither by sound nor jolt was it possible to detect when the wheels passed over the joints. The objection to electric welding is that it leaves no provision for expansion and contraction of the rails under changes of temperature; but where the rails are imbedded in the pavement, the direct action of the sun is shut off from the body of the rail and the changes of length are considerably reduced. Moreover, we believe it is a fact that the number of broken joints that occur in cold weather is not so large as to cause any serious inconvenience, or materially to increase the expenses of upkeep.

It is still open to the inventor to produce some form of connection that will hold the rail ends up to their work independently of any adjustment after they have been first laid. We confess that the problem is an extremely difficult one, and we would advise the inventor who approaches the problem to make a careful study of everything that has been attempted in this line before. Failing the production of such a joint, we would commend to the Public Service Commission the question of electric welding as being one of the most effective methods for reducing the discordant noises on our public streets.

A DELAYED-ACTION TORPEDO.

It cannot be denied that the results obtained with the torpedo in the Russo-Japanese war were disappointing as regards the amount of damage done when the torpedo made a fair hit against the vessel attacked. In more than one case the injury extended but little beyond the immediate point of impact, and was confined to the bursting in of the skin of the ship and the flooding of the one compartment surrounding the point of injury. It was the floating mine, with its enormous charge of high explosive, which sent such ships as the "Petropavlovsk" and the "Hatsuse" to the bottom within a few minutes of contact. We draw attention to this fact with no intention of belittling the great value of the torpedo; we merely wish to point out that in its present condition it is not the absolutely fatal weapon which it was once popularly supposed to be. The comparatively limited amount of injury wrought by the torpedo is not due to any lack of destructive power in the high explosive charge which it carries; for there is enough gun cotton stored in the war head to insure the absolute wrecking of a ship, if its energy can only be developed at the right spot within the structure of the ship. But the torpedo is arranged to explode immediately upon contact with the outer skin of the vessel, and hence, its work is done chiefly upon the hull plating and frequently fails to produce serious effect upon the internal structure. In this respect the torpedo is limited by the very conditions which, up to a few years ago, rendered the high-explosive shells comparatively harmless when delivered against the side armor of a warship; and it was not until the delayed-action fuse was invented, by means of which it became possible to restrain the explosion of the charge until it had passed through the armor, that the high-explosive shell became the deadly and destructive projectile which it is to-day. Evidently, if the torpedo is to develop its full destructive efficiency, it must carry its high-explosive charge through the outer shell and develop its explosive energy well within the ship itself.

The extremely interesting photographs shown on another page of the present issue illustrate the successful trial of a new form of torpedo designed to accomplish the very object above noted. The idea of using the automobile torpedo to carry a gun which should fire its shell into the vitals of a ship at the moment of contact occurred to the inventor several years ago; but because of the difficulties due to the considerable weight involved in constructing a gun of steel, it was not then possible to work out the problem to a practical issue. With the introduction of new alloys of extraordinary strength for their weight, Lieut.-Com. Davis took up the problem again, and in vanadium steel he found a metal which enabled him to bring the automobile gun within the limits of practicable weight. We do not suppose that at this early stage the inventor considers that this remarkable device has shown its full possibilities. Apparently the gun is mounted centrally within the air flask, and if so, the air capacity and, therefore, the range of the torpedo may have been somewhat limited. This, however, might be corrected by an enlargement of the torpedo; and, in any case, it must prove an invaluable weapon for use in the submarine, whose torpedoes will always be delivered at a comparatively short range.

In view of the remarkable results shown in the photographs elsewhere published, we do not hesitate to pronounce this one of the most striking advances made in recent years in the art of torpedo warfare. There can be no question that the destructive effects of this type of weapon have been enormously increased; for reliance can no longer be placed upon the heavy armor plating for keeping high-explosive shells outside of the vitals of a warship. Its effect upon the already complex problem of warship design must be felt at once; for if the device fulfills its early promise, it is certain that the question of extending the armor plating yet further below the waterline will demand the immediate attention of naval designers.

The new German military dirigible balloon, during its second trial on July 1, plunged downward from a considerable height and struck some trees. None of the five men on board was hurt, though the machinery and envelope were damaged.

THE HEAVENS IN SEPTEMBER.

BY HENRY NORRIS RUSSELL, PH.D.

Details concerning the orbit of the eighth satellite of Jupiter, discovered at Greenwich last January, are at last at hand. It is hard to tell which to admire more—the skill of the observers who detected this exceedingly faint speck upon their photographs, and followed its motion for more than four months, or that of the mathematicians who solved the very difficult problems which this motion presented.

Since the discovery of the satellite by Melotte at Greenwich it has been photographed on twelve nights there and also twice at Heidelberg, and three times at the Lick Observatory.

In any ordinary case it would be very easy for an astronomer to determine its orbit from this material; but this is far from an ordinary case.

If Jupiter and the satellite alone came into the problem, it would present no difficulties, for we know that in that case, the latter would move about the planet in an elliptical orbit, fixed in size and position in space, and that its motion in this orbit would take place at a definite rate, depending only on the mass of Jupiter.

It would then be easy enough, by well-known methods, to find from the observations what was the size and shape of this orbit, and the satellite's time of revolution about its primary.

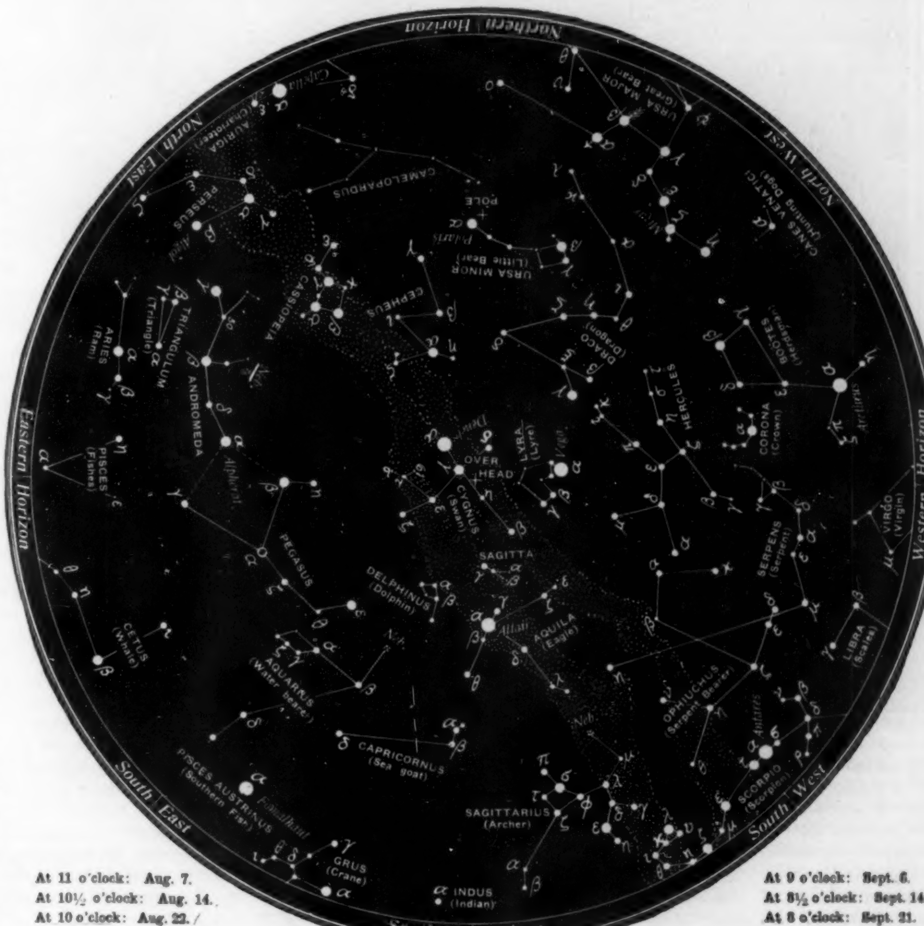
But as a matter of fact, the sun as well as the planet attracts the satellite. If the force which it exerted on the latter were equal in amount and parallel in direction to that which it exerts on Jupiter, it is clear that they would both be influenced by the sun in exactly the same way, and their motion *about one another* would not be changed at all. But since the two bodies are at different distances from the sun, and in different directions, this is not so, and the difference of its attraction on the two tends to alter, or in technical phrase, to "disturb," their relative motion.

When this "disturbing force" is only a small fraction of the attraction of the primary (say one per cent or less) we can take account of its effects by supposing that the elliptical orbit of the satellite shifts about, changing its shape and position, while the satellite itself is set alternately forward or back along this displaced orbit (compared with the position which it would otherwise have accepted). All these changes can be accurately calculated and predicted, though the work involves great mathematical complexity and almost interminable calculations; and this method suffices for the moon and for all previously known satellites. But in the present case the disturbing force is relatively so great that even these methods are not sufficient to handle the problem, and Messrs. Cowell and Crommelin (of the Greenwich staff) have been obliged to invent a new way of attack.

If we know where the satellite was at any time, and how it was then moving, we can calculate the forces acting on it, and then its position at a given time, say a week later. Then, finding what forces act on it in its new position, we can go on for another week, and so, step by step, can extend our calculations as long as we please.

This method is an old one, familiar to astronomers; but the chief difficulty is to start it going, by finding out where the satellite was to begin with, and how fast it was moving.

By very ingenious mathematical devices the English astronomers have solved this problem and calculate a provisional orbit for the satellite, which represents its motion all through the four months of observation, with errors never exceeding 1/500 part of its distance from Jupiter; and they hope to improve their orbit so as to do still better. They find that, as previously suspected, it is revolving about the planet in the opposite direction from all its other satellites. Its distance from the planet was about 19 million miles in January, and 15 million miles at the end of April. If the sun's influence should be suddenly removed, it would continue to revolve about Jupiter in an elliptical orbit, at an average distance of some 16 million miles, with a period of two years and two months; but the solar perturbations may modify this very largely. It will, however, be possible to calculate their effects accurately by these new methods, and so to predict exactly where to look for the satellite when Jupiter becomes observable again next autumn.



At 11 o'clock: Aug. 7.
At 10½ o'clock: Aug. 14.
At 10 o'clock: Aug. 22.

At 9½ o'clock: August 29.

At 9 o'clock: Sept. 6.
At 8½ o'clock: Sept. 14.
At 8 o'clock: Sept. 21.

NIGHT SKY: AUGUST AND SEPTEMBER

THE HEAVENS.

Our map shows what constellations we may find in the evening skies. Right overhead is the great cross of Cygnus, whose arms stretch across the Milky Way. West of it is Lyra, and south is Aquila, with the smaller groups of Delphinus and Sagitta. Sagittarius is a little west of south lower down, and Scorpio is setting in the southwest. Ophiuchus and Serpens occupy the sky above it. Hercules and Corona are almost due west, with Boötes below them. The Great Bear is low in the northwest. Draco and Ursa Minor are above it. In the northwest Capella, the brightest star north of the celestial equator, has just risen.

Perseus is rising due northeast, and Cassiopeia and Cepheus are above him—all three in the Milky Way. The great square of Pegasus is due east. To the left of it extends Andromeda, below which are Aries and Triangulum. The bright object low down, almost due east, is the planet Saturn, and the one in the southeast the star Fomalhaut, in the Southern Fish. The other constellations in this part of the sky—Aquarius, Capricornus, and Cetus—have no bright stars.

THE PLANETS.

Mercury is evening star throughout September, but being far south of the sun, is visible only with difficulty. At the end of the month, when conditions are most favorable, he sets only about half an hour after the sun.

Venus is morning star. She is at her greatest elongation west of the sun on the 14th, and is very conspicuous all through September, rising about 2 A. M. She can easily be seen in the daytime by watching her every few minutes during the dawn, when it will be found that she remains visible even after the sun is up. Mars is likewise a morning star, but is too near the sun to be well seen. Jupiter is also a morning star, rising at about 3:30 A. M. at the end of the month.

Saturn comes to opposition on the 30th and is visible all night long. His rings are apparently opening out again, and he presents once more the familiar telescopic appearance.

Uranus is in Sagittarius, and comes to the meridian about 7:20 P. M. on the 13th. Neptune is in Gemini, observable only in the early morning.

THE MOON.

First quarter occurs at 4 P. M. on September 3, full moon at 7 A. M. on the 10th, last quarter at 5 A. M. on the 17th, and new moon at 10 A. M. on the 24th. The moon is nearest us on the 9th, and farthest off on the 22d. As her nearest approach to us almost coincides with full moon, we may expect unusually high tides about that date, for everything cooperates to make them so. She is in conjunction with Uranus on the 5th, Saturn on the 11th, Neptune on the 19th, Venus on the 21st, Jupiter on the 22d, Mars on the 24th, and Mercury on the 27th.

At 6 A. M. on September 23 the sun crosses the celestial equator, and enters the sign of Libra, and in almanac parlance, "Autumn commences."

Princeton University.

FERMENT OF EGG YOLK.

The yolk of the egg contains a ferment which is capable of converting starch into sugar. This ferment is remarkable for the slowness and the consequent long duration of its action. After placing it in contact with the starch the saccharifying action is hardly commenced after an hour, and it takes a month or more to complete it entirely. In a communication made to the Société de Biologie, M. H. Roger brings out some new facts about the ferment of egg-yolk and shows that it is remarkable from the fact that it is soluble in ether. If egg yolks are exhausted by ether and the resulting extract is evaporated at a low temperature, the residue of the process will convert starch into sugar provided it is well mixed with starch paste so as to form an emulsion. The ether extract should not, however, be heated too strongly as it becomes inactive when heated above 80 deg. C. After treating the egg yolk by ether as above mentioned, there remains a viscous mass, and if this latter is treated by distilled water, the resulting extract has also the saccharifying property, and a part of the ferment still remains in the original mass of yolk after the ether and the water treatment. It might appear that these ferments are not identical, and we might conclude that the egg yolk contains three different ferments, one of which is soluble in ether, the second in water, and a third which is insoluble in these two liquids. The author, however, is inclined to believe that there is but a single ferment, which is intimately united to the different substances which go to make up the yolk of the egg. One part of the ferment is thus united to the fatty matter and like portions which thus form a combination soluble in ether. Another and larger part adheres to albumens and other substances which are removed by water. The last portion is united to the substances which form the insoluble residue.

The Royal Automobile Club's dust trials were recently concluded at Brooklands. The vehicles had to run over a stretch of fine limestone dust 200 feet long and 10 feet wide, at the end of which a heap of dried leaves was placed. One device submitted was for sucking the dust from the wheels and depositing it on the road in granulated form. Owing to some defect in the mechanism the apparatus was not seen at its best in the first run, but some of the later runs showed an improvement. Another device was a perforated sheet steel screen underneath the car body, with forced drafts above the screen. Tests with disk wheels, different shaped tires and bodies and other fixtures were made, and a photograph of each test was officially taken.

REINFORCED CONCRETE AS A BUILDING MATERIAL FOR BOATS.

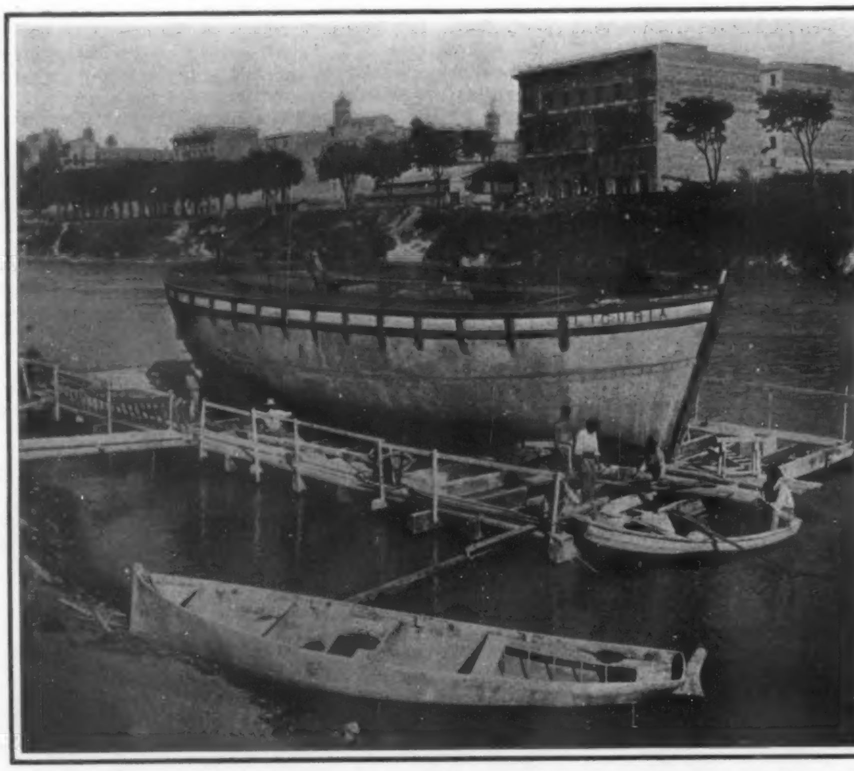
BY THE ENGLISH CORRESPONDENT OF THE SCIENTIFIC AMERICAN.

The utilization of reinforced concrete as a constructional material for various purposes for which masonry, wood, or ironwork has been previously employed, has undergone considerable development during the past few years. One of the most novel applications of the system, however, is that which has been evolved and perfected by a well-known Italian engineer, Signor Carlo Gabellini, of Rome; namely, its adoption for the construction of boats and floating structures in general, such as pontoons, floating bridges, and so forth.

Signor Gabellini first drew attention to the possibility of extending such a system to maritime purposes, as far back as the nineties; and in order to demonstrate the feasibility of the idea, built a small rowing boat capable of carrying some four or five people. The whole of the craft from keel to gunwale, including seats and rudder, was carried in armored cement, and upon launching was kept in the water at Port d'Anjio for four years, to illustrate on a practical scale that the immersed cement surface is not damaged by sea water and offers no suitable adherence surface to seaweed and other marine growths. To-day the boat is still in service, the hull never having once been cleaned, and is in as good condition as when first placed in the water. That salt water exercises no deleterious effect upon the cement sheathing is perfectly obvious; and although the boat has been in constant use for some eleven years, the surface is without the slightest pitting or traces of decomposition. During the whole of this period the hull has required no repairs whatever, which fact points to the durability and serviceability of reinforced concrete for such purposes.

The signal success of this initial practical experiment was followed in the same year by the construction of a floating châlet or boathouse for the Aniene rowing club, which is still moored to the bank of the Tiber. Similarly, in this instance the whole of the building, including both the pontoons and the superstructure, was carried out in reinforced concrete.

There are eight pontoons disposed in two outer rows extending to a total length of 67 feet by 21 feet beam. Each pontoon measures approximately 16 feet in length by 9 feet beam. They are of rectangular section, of the flat-bottom type, there being a slight batter of about 15 degrees from the bottom to water level, whence the sides rise vertically to the top of the structure. The shell is of the single-wall type, strengthened transversely by cross beams, also executed in the same material. The iron skeleton comprises iron rods of round section with iron network or expanded metal between, around which the concrete is built. The pontoons after construction were towed to their destination and bolted firmly together in two rows, the intervening space of some 3 feet between each row being occupied by transverse reinforced-concrete girder members extending from the water level to the upper edges of the pontoons, placed at intervals so as to come in line with the transverse supports of the pontoons, thereby giving continuous strength at those points from side to side of the structure. The whole was bolted up to form a rigid homogeneous floating mass, the ends of the pontoons on the upstream face being wedge shaped to form cutwaters, the other extremities being left square in section. Upon this raft the boathouse was built, consisting of a single floor at either end with a double-decked house in the center, the roof line of which runs at right angles to the main building, which extends longitudinally. The vertical uprights of the iron reinforcement of the building rise from the floor level, and the intervening spaces between are filled with expanded metal, the roof being built upon the same lines. As may be seen from the accompanying illustration, the external characteristic appearance of a châlet is preserved, the pseudo-wooden joists being relieved with rough-cast.



The Barge "Liguria" in Course of Construction on a Floating Pontoon. The Boat in the Foreground Is One of the First Boats Built of Reinforced Concrete.

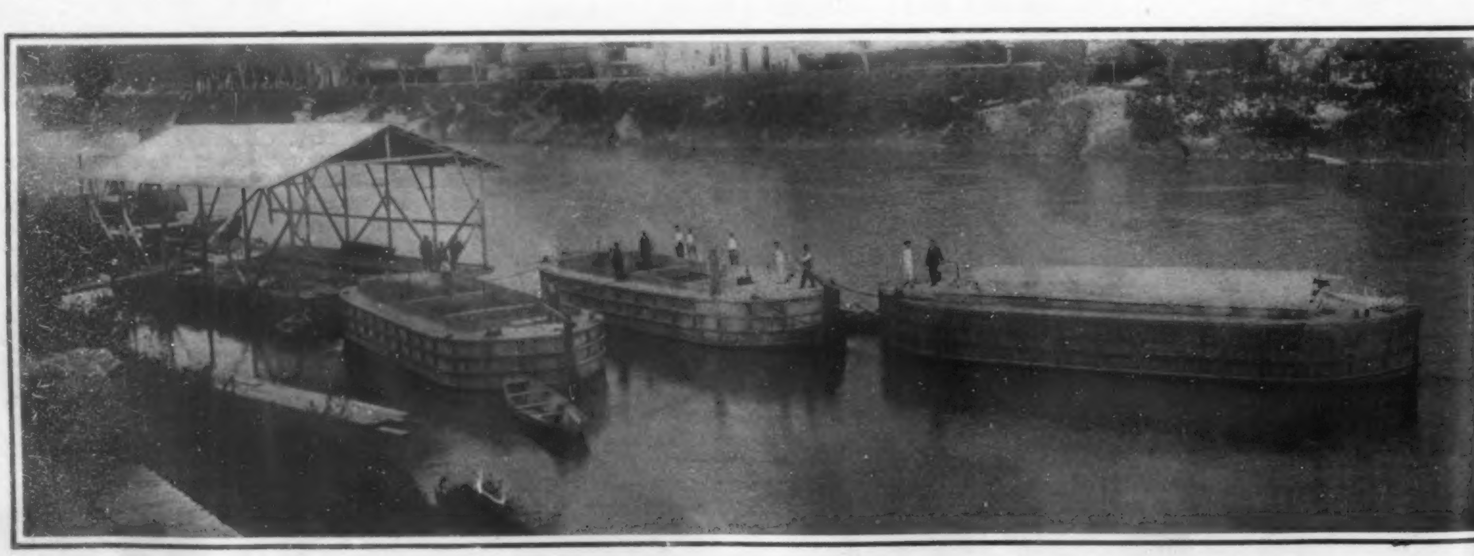
In the past two or three years, the efficiency of the system having thus been demonstrated over a period of nearly a decade, the principle was applied to larger vessels, such as freight barges, one of the first of these being the "Liguria," the construction of which was commenced in 1905. This craft is 54 feet in length with a beam of 18 feet. Construction was carried out upon the same lines, and the disposition of the iron reinforcement and expanded metal may be seen in the accompanying illustration, where the hatchway is being completed. In order to reduce resistance to the water to the minimum, the outer surface is cleaned, rubbed down, and smoothed until it has the appearance of polished marble and experience has shown that once this effect is achieved, the surface is preserved indefinitely, so that the craft always offers a minimum of skin friction in the water.

The illustration also shows the manner in which the vessel was constructed. Instead of being built upon an inclined slip on the river bank and then launched when completed in the usual manner, the stocks were provided on a floating pontoon dock, built in reinforced concrete. When ready for transference to the water, the pontoons at one end were submerged, in this manner providing the necessary inclination to insure the boat's traveling down the slipway into the river.

Upon completion the "Liguria" was towed down the Tiber from the building stage to Genoa, and is now in daily service in the harbor, transporting coal. During the two and a half years it has been in commission, the barge has given complete satisfaction. There have been no maintenance charges whatever, and the slight resistance offered to the water, owing to the smoothness of the outer surface of the hull and its immunity from clogging by marine growths, has been a noticeable feature, in comparison with the difficulties encountered in this direction by other wooden, iron, and steel vessels plying in these waters. In consequence concrete craft maintain a constant high degree of efficiency.

The results that have already been achieved have proved the complete adaptability of armored cement to marine construction. Although a boat so built is somewhat heavier than if wood were employed, it has the compensating advantage of being far more economical to maintain. Construction itself can be carried out as rapidly if not more expeditiously as in either wood or metal. Researches have shown the tenacity of the adherence of the cement to iron, and Signor Gabellini has carried out several experiments in this direction himself. In his laboratory he erected a small mechanical apparatus supporting a block of cement about eight inches square, in which was imbedded a section of round iron rod such as he uses in his system. A weight of 1,320 pounds was suspended from the iron rod, the object being to force it away from the cement, but although the strain was applied continuously for three months, no evidence of separation was observable, and the block was found as perfect and as intact as the day upon which it was made.

The question naturally arises as to the capability of such a structure to withstand such shocks as pounding against piers and other craft. Tests in this direction have conclusively proved that although the fabric

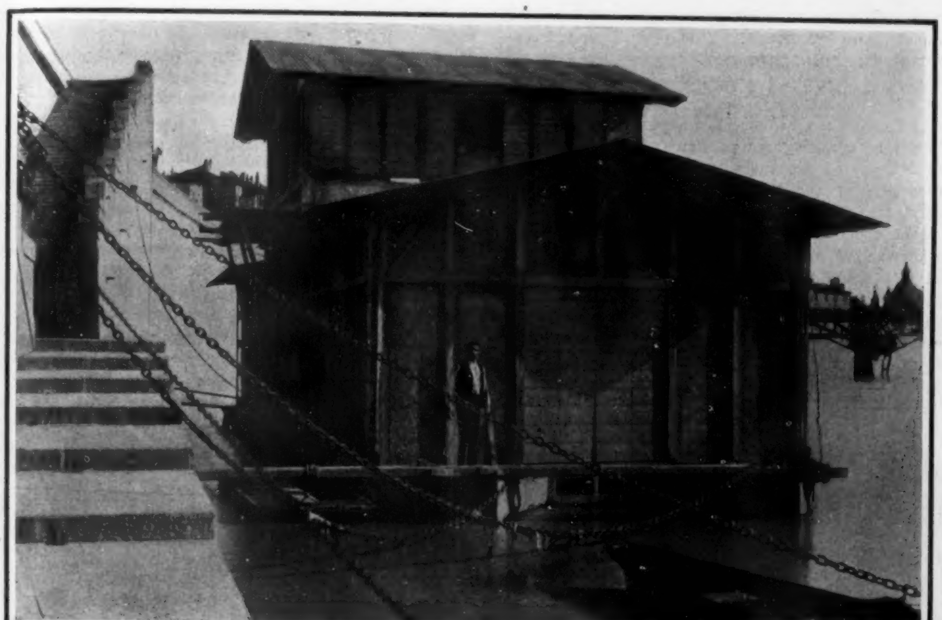


Three 100-Ton Reinforced Concrete Cargo Boats, Built for the Italian Government, Ready to be Towed to the Military Harbor of Spezia.

REINFORCED CONCRETE AS A BUILDING MATERIAL FOR BOATS.

has great rigidity, yet it possesses a certain degree of elasticity, and even should the blow be sufficiently violent as to damage the fabric, the injury is purely local in character.

The system of construction is very simple. The keel is laid in the usual manner, the iron rod reinforcement being anchored to the armoring of the former, and being brought up the sides of the hull in conformity with the desired lines of the craft. The



Floating Chalet of Reinforced Concrete for the Aniene Rowing Club on the Tiber.

iron rod generally used has a diameter of about 0.4 inch. The expanded metal, which has a mesh of about 0.2 inch, is stretched between the vertical supports, to which it is attached by suitable metal clips. The concrete is then applied to the skeleton fabric in layers inside and out equally, the thickness of this sheathing varying according to the dimensions of the craft. It will thus be realized that building can be carried out very cheaply, while it also does not call for such highly skilled labor as ordinary shipbuilding. The cement work completed, the outer surface is subjected to a thorough cleaning to give the requisite polished, marble-like appearance.

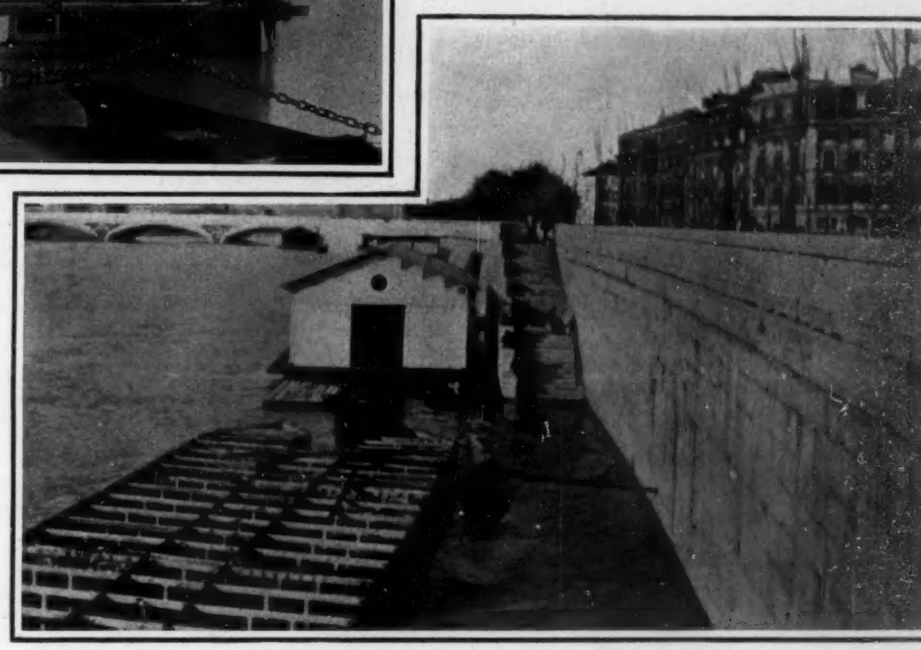
The system has been utilized for the peculiarly shaped boats which serve to support the decks of the quaint floating bridges to be found on the River Po. Hitherto wooden boats have been strung across the waterway, the deck planking, built in sections, being laid transversely across them. When a vessel desires to pass in either direction, the necessary opening is made by withdrawing a certain number of boats together with the bridge decking clear out of the way, thus leaving an uninterrupted channel, the bridge being reformed merely by rowing the boats into their normal position. The boats are of peculiar design, having sharp-pointed rising ends. In such reinforced concrete the same general lines are preserved, only the ends are made blunter, a greater midship beam is provided, while they have perfectly flat bottoms, forming a kind of pontoon. Each boat is 45 feet in length, with a beam of 12 feet and a depth of 3.6 feet. So satisfactory have the craft proved in service, the absence of repairs being a pre-eminently distinguishing feature, that the wooden boats for these quaint floating bridges are being superseded by the reinforced concrete craft as rapidly as possible, over one hundred having already been built for this service.

A few months ago the Italian government, whose engineers had reported favorably upon this system of construction, contracted with the Gabellini Company for the construction of a special type of 100-ton cargo boat which should be suitable to their requirements, for the purpose of submitting the principle to a series of exacting tests to determine practicability, efficiency, stability, and seaworthiness. The boat was built at the floating shipyard of the company on the Tiber at Rome. The boat has an overall length of 51 feet, with a beam of 16 feet and a depth of 7.5 feet, the draft without cargo being 3 feet. The type adopted is pointed fore and aft with a single clear hold. In outward appearance it differs slightly from the "Liguria." The hull has a double shell, the intervening space being subdivided into a number of water-tight compartments, each complete in itself, while the outer shell above the waterline, where it is subject to the greatest possible damage from collision with other objects, such as quays, piers, and other vessels, is especially strengthened, so that in the event of one or more compartments being pierced, the craft will still remain afloat.

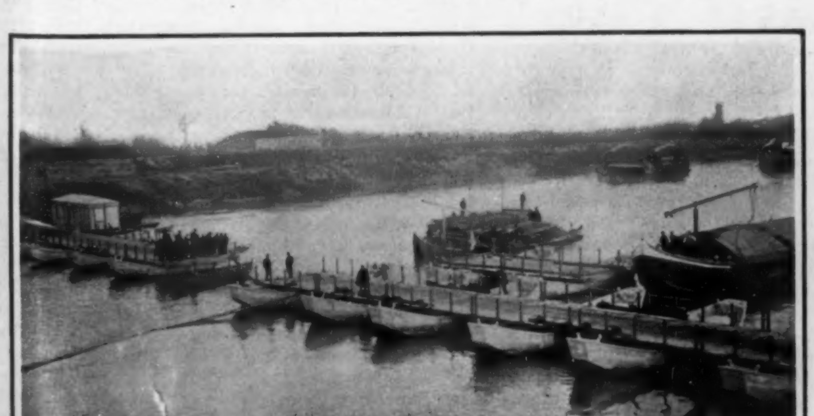
Upon completion this freighter was towed to the military harbor at Spezia, where it was subjected to a severe series of tests by the military department. These proving completely satisfactory, the government ordered four similar barges of the same dimensions and tonnage, which are now being completed. These craft are additionally strengthened transversely by concrete beams, which extend straight across the holds. The external shell is divided into panels, and when a rent is made in the fabric, it is necessary only to lay bare the iron reinforcement at the point of injury, repair the damaged sections of metal armoring and network, and apply the coating of cement. In this manner the most extensive injuries can be easily repaired in the course of a few hours. The system moreover is more hygienic than either wood or iron, and can easily be maintained in a perfectly clean condition, the holds being flushed out with a hose.

Signor Gabellini is advocating the manufacture of armor plates upon this principle. The system is fundamentally the same as adopted in torpedo boats, but is considerably strengthened. The plate is built up to the requisite thickness of superimposed layers of the armoring, with intervening layers of cement, and so made as to form a perfectly homogeneous plate. In this arrangement the iron rods are disposed at right angles to one another in each layer, to secure the maximum effect of resistance and strength. The number of layers of reinforcement can be varied as desired. From the experiments the inventor has made he has determined that it is possible to secure the same degree of resistance to projectiles as a given steel plate with from 33 to 50 per cent less metal. The advantage of such a plate, he points out, in addition to its high degree of resistance to penetration, is the facility with which it can be repaired.

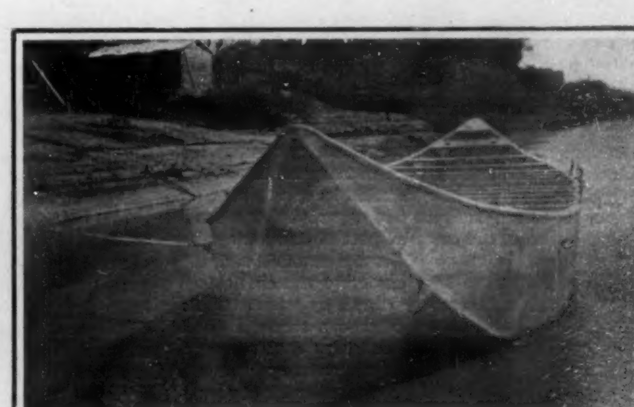
Concrete boats are not altogether a novelty in the United States. An engineering firm in Missouri has been engaged for some time in building small concrete power-propelled boats for river use.



The Pontoons Which Support the Floating Boathouse.



A Floating Bridge on the Po Supported on Reinforced Concrete Pontoons.



A Reinforced Concrete Pontoon for the Bridge at Pavia.

REINFORCED CONCRETE AS A BUILDING MATERIAL FOR BOATS.

Henri Becquerel.

Antoine Henri Becquerel died in Paris on August 25, 1908. With his death there has passed away one of the world's most distinguished physicists, one of a line of distinguished men of science.

Prof. Henri Becquerel was the grandson of a celebrated physicist, Antoine César Becquerel, and the son of an equally illustrious physicist, Alexandre Edmonde Becquerel. At the time of his death Henri Becquerel was professor of applied physics. When he first began his course of lectures in 1892, at the Museum, with characteristic modesty he never once referred to his own name in passing in review work of his predecessors, despite the fact that these predecessors were his father and his grandfather. His educational activities were not confined to the Museum, for he was actively engaged at the Conservatoire des Arts et Métiers, and was also one of the Chief Engineers of the Department des Ponts et Chaussées.

Henri Becquerel first came prominently before the public when he began the investigation of phosphorescent and fluorescent substances shortly after the discovery of the X-rays, for the purpose of ascertaining whether their phenomena might not be attributed to causes similar to those which give rise to the properties of the Crookes tube. He found that they projected emanations entirely different in character—emanations which have been fittingly named "Becquerel rays."

Born in 1852, Henri Becquerel entered the Ecole Polytechnique at the age of 20. The three years from 1874 to 1877 were spent at the Ecole des Ponts et Chaussées, a preparatory school in which the construction of roads and bridges and civil engineering in general is taught. Although an engineer by training, Becquerel was soon attracted to the study of pure science, following in the footsteps of his eminent grandfather and father. In 1878 he entered the Museum of Natural History, an institution with which the name of Becquerel will be ever linked. Since 1895 he filled a professor's chair at the Ecole Polytechnique. He was a member of the Academy of Sciences since 1889.

Becquerel's laboratory work was admirably systematic. For weeks he experimented and observed the results of his experiments in accordance with a well-defined plan. Probably it would not have been impossible for him to have stated far in advance what particular phase of scientific research was to have received his attention on a certain day a year hence. And this systematic plan, which he followed more or less throughout his entire career, may be considered a continuation of the work of his father and grandfather. Despite the fact that there was hardly a branch of pure science in which he did not make some important discovery, he occupied himself chiefly with the problem of those mysterious luminous phenomena which his father before him had studied, and the solution of which his grandfather had dimly foreseen. This continuity of scientific purpose and investigation lends a peculiar interest to the labors of the Becquerel dynasty.

Henri Becquerel labored long and faithfully in the fields of electricity, magnetism, optics, and meteorology, but the researches which he carried on in these fields are really part of a well-defined system having for its object the study of electro-optic phenomena such as the invisible infra-red spectrum and the absorption of light. All his investigations were carried on in the physical laboratory of the Museum of Natural History which was the scene of the labors of his father and grandfather before him. Starting with Faraday's splendid discovery of the relation of electro-magnetism to light, Becquerel succeeded in showing the existence of a fundamental relation between the rotary magnetic power of bodies and a very simple function of their index of refraction. The limitations of this article prevent me from following in detail the interesting development of Becquerel's theories. Hundreds of observations were made which lead to the conclusion that the phenomena of electro-magnetism are intimately connected with the speed of propagation of luminous waves, and to an inter-molecular magnetic action. Negative rotations in the plane of rotation of light were studied minutely, and clearly and simply explained. The Faraday phenomena were discovered in gases, an entirely new domain, by means of wonderfully ingenious and sensitive apparatus. The magnetic influence of the earth as part of this systematic plan of investigation was likewise studied, and the results obtained have fully confirmed the conclusions which have been inductively drawn by scientists. So far, indeed, were these investigations carried, that a method was devised for determining the rotary magnetic power of a body, and of ascertaining by simple optical measurements the absolute intensity of terrestrial magnetism. Naturally Becquerel was ready to approach from an entirely new standpoint the phenomena of atmospheric polarization, with the result that he had made discoveries that are ill described by the simple word "startling."

Becquerel's study of invisible infra-red radiations was not the least interesting work which he accomplished. Here he followed directly in the footsteps of his father, who had discovered that these thermo-rays cause the phosphorescence of a substance which has been previously rendered luminous. This may be said in a measure to be the starting-point of the discovery of the radio-activity of matter. By projecting on a phosphorescent surface discontinuous spectra of incandescent metallic vapors, he discovered a series of rays, the existence of which had never been suspected. He was thus led to examine the invisible vapors of different metals. This opened up an entirely new field in spectroscopy.

Becquerel's interesting investigations of the absorption of light by various bodies bring us nearer to the subject of radio-activity; for the compounds of uranium were used in studying the phenomena of phosphorescence. He proved the variability of the spectra with the direction of the luminous vibrations by which they were traversed. All these researches led to a new method of spectrum analysis, based on the independence of the various substances of which a single crystal is composed, and rendering it possible to determine the structure of the crystal without fracture. It was this work that earned for him a place among the members of the Academy of Sciences. While continuing his studies of phosphorescence and light, he still found time to investigate fluorine.

It is impossible in the brief space at my disposal to enumerate all the discoveries which have been made by Prof. Becquerel. A modern scientific bibliography, however, would be very largely composed of studies bearing his name; they would include monographs of all kinds on radio-active substances and radio-activity.

The Rateau System of Power Generation from Exhaust Steam.

Of late there has been a very considerable amount of work done in the reclaiming of the large powers usually dispersed to waste in the exhaust of the heavy power engines of mines and steel works. The common type of hoisting engine running with high-pressure steam and exhausting to atmosphere is by itself an extremely inefficient power unit. It has for many years been apparent that some means of collecting and utilizing the considerable energy carried in these high-pressure exhausts would introduce great economies in the working cost of an establishment. With the development of the steam turbine it became evident that here was a machine suitable in every way for operation, in conjunction with a condenser, at a steam supply of atmospheric or slightly higher pressure, but to adapt the low-pressure turbine for operation with the exhaust steam of winding or rolling mill engines meant facing the difficulty that such a steam supply is extremely intermittent. It became necessary, therefore, to devise some means of leveling the pressure or supply of the exhaust steam available so that the turbine should receive steam supply constant in pressure and volume. Prof. Rateau, of the School of Mines, Paris, invented and patented what he terms heat accumulators, which, interposed between the main engine exhaust and the turbine supply, serve the purpose of economically receiving and storing the exhaust steam, giving up a constant pressure supply to the turbine. The first working application of this system was made in France in the year 1902 and its success is well exemplified by the very many similar installations which are now at work in England, on the Continent, and in America. The first plant to be put down in Great Britain was that of the Steel Company of Scotland for their Hallside works in May, 1905.

As will be readily understood, the accumulator is the essential feature of this modern means of generating power from exhaust steam. This invention is based upon the well-known principle regarding the reciprocal action of saturated steam and steam-saturated water; when these two fluids are brought together they preserve a state of equilibrium, and any variation in this balance determines the transformation of either steam to water or water to steam with a definite heat liberation or absorption respectively. This principle is applied in a number of types of accumulator, any one of which may be adopted as desired by the engineer or as deemed expedient under certain local conditions. The most usual form of accumulator, known as the water type, consists of a cylindrical shell carrying two or more oval perforated tubes running throughout its length. The main engine exhaust feeds into the oval tubes and is spread or dispersed into the water which just covers the tubes, a baffle plate over the tubes serving to prevent priming of the accumulator, from the upper portion of which steam is drawn direct for the turbine supply. Several of these accumulators may be used where large powers are handled, or a large single accumulator can be arranged with two or more compartments divided off by a suitable horizontal diaphragm. The accumulator is fitted with the necessary special automatic relief valves, draw valves, water level regulators, gages, etc. As will be understood, the arrangement of the long, finely perforated tubes insures the thorough and rapid circulation of the water. In other types the circulation of the water has been obtained by means of steam injection, pumping water over trays, and mechanical agitation.

Another type of accumulator which is giving every satisfaction in use is one which consists of an inclosed vessel packed with a very large quantity of scrap iron so that an enormous surface of metal is interposed in the main engine exhaust. Thus in some few cases where old rails and other similar metals abound an old boiler shell has been packed with these and served very well as an accumulator. It will be evident in this case that the regeneration depends upon the quantity of water condensed by the mass of rails and held up in the interstices between them.—The Electrical Magazine.

The Current Supplement.

The current Supplement, No. 1705, presents an excellent portrait of the late Prof. Henri Becquerel. The fourth dimension is simply discussed by H. Addington Bruce. In an excellent article Ernest Solvay discusses some novel ideas suggested by the experiments of Myers, Dixon, Baker, Lebeau, and others to formulate the general principles which distinguish absolute physico-chemical reactions between absolutely pure substances from thermo-catalytic reactions effected by an organization which is developed under the influence of foreign bodies. In other words, Mr. Solvay shows the relation which physico-chemistry bears to biology. Under the title "An Economical Fire Alarm," an article is published which describes how a locomotive tire can be used as a village fire-alarm bell. The Bellini-Tosi experiments in directive wireless telegraphy are described in detail. The second installment of the article on Galvanizing appears. "Free Lime in Cement" is the title of an article which gives many a useful suggestion. H. M. Ripley writes competently on applications of oil-burning apparatus. Physiology has long since passed the stage where unaided observation alone is of value, and has become pre-eminently an experimental science. Its modern tendencies are excellently set forth by Prof. Frederic Schiller Lee of Columbia University. Pictures of the wreck of the Zeppelin airship are also published, and an account of the circumstance which brought about the destruction of the great craft.

Current Rushes During Switching.

In a recent issue of the Electric Journal, Mr. J. S. Peck deals with the current rushes at switching on transformers. When transformers at low frequencies—25 to 33 alternations—are switched on to a circuit there are at times heavy rushes of current sufficient to open circuit-breakers, although these may be set for a current much in excess of the full-load current. It is shown that these take place when the phase of the impressed voltage is at or near zero, since if there happens to be no residual magnetism in the transformer and the switching on is at the instant the impressed voltage is zero, the maximum induction in the iron will be double the normal induction, and the primary current double or more than the normal; the effect of the ohmic resistance will be to reduce the current to the normal after a few complete periods have elapsed. The effect of residual magnetism will be either to increase or reduce the maximum value of the induction, according to its value and direction, in relation to the phase of the impressed voltage at the instant of switching. The reason that this phenomenon is practically unknown at high frequency is that on these circuits transformers are seldom worked at a higher induction than 6,000 c.g.s.-lines per square centimeter, while on 25 alternation circuits inductions of twice this value are adopted.

The use of kieselguhr in Germany is now very extensive, states the United States consul at Chemnitz, who furnishes the following information concerning the deposits of infusorial earth in Germany and the articles manufactured therefrom: Large amounts are employed in the manufacture of dynamite, where the remarkable absorbent properties of the material come into play. Its use alone as a fertilizer, and also in the preparation of artificial fertilizers, especially in the absorption of liquid manures, is widespread. There is also an extended use of the earth for rapid filtration purposes, as well as for covering steam pipes, lining refrigerators, and filling the walls of fireproof safes. In the manufacture of water glass, of various cements, of glazing for tiles, of artificial stone, of ultramarine and various pigments, of aniline and alizarin colors, of paper, sealing wax, fireworks, gutta-percha objects, Swedish matches, solidified bromine, scouring powders, papier-maché, and a variety of other articles, there is a large and steadily growing demand. For some of the purposes in question, and especially when kieselguhr is used to absorb nitro-glycerine in the preparation of dynamite, it is of prime importance that the earth should be freed as far as possible from moisture.

Correspondence.

Test of a Full-Sized Bridge Chord.

To the Editor of the Scientific American:

An editorial article in your last issue on "Proposed Test of Full-sized Blackwell's Island Bridge Chord," contains an error to which I beg leave to call your attention.

The test with small tubes for the steel arch bridge over the Mississippi River at St. Louis was not actually made, but had been proposed by Col. Flad, who at that time was Capt. Eads's principal assistant.

By referring to Prof. Woodward's "History of the St. Louis Arch Bridge," page 119, you will also find indicated the reason why the proposed test was not carried out, i. e., the necessity to avoid even small expense, a reason which does not apply in the case of the Blackwell's Island bridge. Gustav Lindenthal.

New York, August 31, 1908.

Proposed Rearming of Our Warships.

To the Editor of the Scientific American:

I follow all articles on the United States navy very closely. In fact, I take your paper solely for the information that I get on our navy as well as those of other countries.

I have read Mr. H. M. Kennard's article closely and enjoyed it, and indorse his sentiments heartily. If opinions from readers and laymen are in order, I would like to present a few ideas of my own. If his ideas of modernizing our next latest battleships of "Georgia" and "Connecticut" classes and making "Dreadnoughts" are practicable, it is an excellent thought. But it occurs to me that these are very formidable ships, and would give good accounts of themselves in any line of battle. If any changes are to be made, why not substitute two 45-caliber high-power 12-inch rifles for the four 10-inch rifles proposed by Mr. Kennard?

In a four-mile engagement one new 45-caliber 12-inch would do more damage than two 10-inch and require fewer men to handle it. These 12-inch rifles could be placed one in a turret on the beam. It would hardly be worth while to take out 8-inch guns and put in 10-inch. If a change is made, substitute 12-inch. Another cogent reason for putting in 12-inch guns is to keep down the number of calibers of guns on a ship.

If Mr. Kennard's suggestions were carried out, the "Connecticut" or "Georgia" would have 12, 10, 8, and 6-inch rifles on her. Substitute 12-inch for the 8-inch and leave out the 6-inch and you would have real "Dreadnoughts." The 12-inch ammunition passages and hoisting gearing could be extended to the two new turrets instead of installing an entirely new size.

My idea is that if any changes be made, they should be on the ten or twelve new cruisers of the "Washington" and "Tennessee" classes.

Take the "Tennessee" for instance, with her four 8-inch rifles. She could never get into a modern sea fight because the battle will be fought at four or five miles' range, and her 8-inch guns would be harmless, while she would be exposed to the fire of modern 12-inch rifles, and not being able to return the fire would have to get away if she could. Suppose four 12-inch rifles were put in place of the four 8-inch, and all of her fourteen 6-inch guns were replaced by ten 5-inch rapid-fire rifles, and all her flying bridges and military masts were taken off and the tripod skeleton mast placed. Enough weight could be saved on these fine 13,500-ton cruisers to make these changes. Then the ten or twelve practically useless new armored cruisers would make a fleet of fast 20 to 22-knot battleship-cruisers. These cruisers could operate with the new "Dreadnought" class of battleships now building, and when a battle came on could take their places in the first line and stay there too. With new 45-caliber 12-inch rifles they would be good matches for anything excepting new "Dreadnoughts."

Now suppose four of these new "Tennessee" cruisers with the 12-inch 45-caliber rifles are cruising on the flanks of a fleet and come in touch with the enemy. They stand some chance of sinking detached battleships of the latest design, or of getting away in case the enemy is too strong. With the puny four 8-inch rifles they could neither keep the enemy off nor get away from 12-inch guns. Six-inch rifles are obsolete. They are not heavy enough to sink anything, or even get in reach of anything, and are too heavy to keep off torpedo attacks.

My idea would be to take all the 6-inch batteries off the new cruisers, substitute one-half the number of rapid-fire 5-inch and then place four 12-inch 45-caliber rifles in two turrets on these ships. Certainly on a displacement of 13,500 and 14,500 tons this can be done, by doing away with the heavy flying bridges, cranes, military masts, etc. Why haul hundreds of tons of 6-inch ammunition besides the guns around when neither would be effective in a modern sea fight? Better do away with the 6-inch guns entirely and use the displacement to carry ammunition for four modern 12-inch rifles, after providing a light rapid-fire battery to keep off torpedo attack. When a fleet is cruising thousands of miles away from home, the more homogeneous the fleet can be made in respect to size, speed, and uniformity in size of guns, the more effective will that fleet be. What use would 10,000 tons of 6-inch shells be to a fleet of "Dreadnoughts" that needed 12-inch shells?

By battleships as well as cruisers all having their main armaments 12-inch, one ship could supply another's needs before and after battles on far-away stations, to say nothing of the extra guns and gun repairs that would be carried by a fleet on a distant station.

It would seem to me very inexpedient to introduce another caliber into the United States navy. The 10-inch gun is carried on a very limited number of our cruisers. Why not do away with it also and make the 12-inch the one and only heavy rifle in the United States navy? Then one ship could supply another in case of need, and all could fight with equal effect in the battle line. A. B. Wingfield.

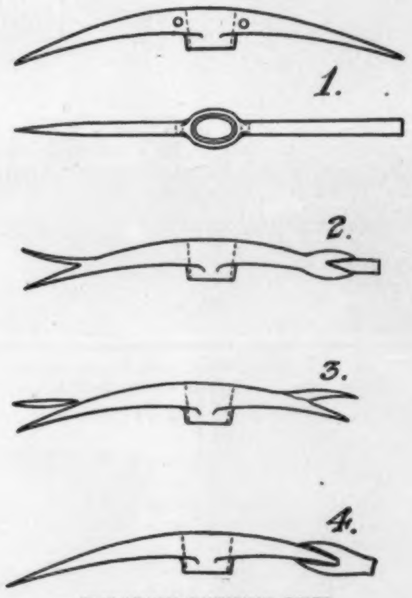
Charlotte, N. C., August 15, 1908.

[To change the armament of a ship in the way suggested by our correspondent is a far more complicated problem than is generally supposed. The concentrated weight of a 12-inch gun emplacement would so seriously affect the stresses in the hull structure of a cruiser as to call for costly changes and an increase of hull weight. The strongest objection would lie in the light 6-inch armor protection, and the fact that the increase in gun and turret weight would sink this light armor belt even lower in the water than it now is. Such changes have been frequently proposed in other navies; but the consensus of opinion is that appropriations are best expended on absolutely new construction.—Ed.]

REPAIRING RAILROAD PICKS.

BY I. C. BAYLEY.

The body of a pick is generally made of a low-grade steel, but the points are either of cast steel or high-grade tool steel.



REPAIRING RAILROAD PICKS.

On account of the body being of a low grade, it is no unusual thing for an energetic laborer, when hammering the pick down upon the helve or handle, to split the eye or even burst it open.

For this reason, in one of the railroad shops, where many of these picks are repaired, the blacksmith conceived the idea of drilling two holes near either side of the eye, as shown in No. 1, and inserting a couple of countersunk rivets, after which he declared that very few picks came to him for repairs in that particular spot. But to my mind the best wrinkle he gave to me was in welding the steel points on the ends.

No. 2, at the right-hand side, shows one of the usual manners of doing this. The ends of the pick are split open for a little way, to take the point, which is made wedge shape at one end, and the whole welded together and brought to a point, as in No. 1. But it was noticed that when these same energetic laborers used their picks for levers, they came back to the shop with the points missing, and wide open jaws, as shown to the left of No. 2.

Another method, called the German, I believe, is to weld a piece of steel on one side the point, as shown to the right of No. 3. When any of these came back, they were worse than the first, for they came back not only minus the point, but the half-welded jaw.

It will also be seen that in both of the cases mentioned, the wear and tear of the pick is on the low-grade steel jaws as much as the high-grade steel points. So instead of splitting open the ends of the pick, the blacksmith split the steel point as shown to the right of No. 4. When those came back to the shop for repairs, they were generally as seen to the left of No. 4, and only needed the points put to the emery wheels.

Kitchen Ice-Making Machines.

Consul-General Robert P. Skinner writes that kitchen ice machines have been upon the market in France for a dozen years, but apparently they never have advanced much beyond the interesting scientific toy stage. In the chief bazar of Marseilles one model remained on hand the price of which was 75 cents, and the salesman said that it had been imported from the United States. In this device, similar in form to a domestic ice-cream freezer, the water is placed in a tin receptacle, which is plunged into nitrate of ammonia. After agitation, ice is formed and withdrawn from the tin.

Better machines of French manufacture were upon the market for a long time, and sold for from $6 to $10. The manufacturers claimed that the nitrate of ammonia could be used over and over again, but in practice this appears not to have been the case. So much dissatisfaction followed the sale of these devices that most of the local dealers soon ceased to handle them.

At the present time one reliable Marseilles house is selling with satisfactory results another form of freezing machine, worth from $17.37 to $27.02, according to size. No. 0 gives 300 grammes (10.58 ounces) of ice per thirteen minutes; No. 1, 600 grammes (21.16 ounces) in fifteen minutes; No. 2, 1,200 grammes (42.32 ounces) in fifteen minutes, and No. 3, 2,400 grammes (84.64 ounces) in twenty minutes. This device consists of a porcelain recipient for the water, which is placed inside a larger recipient containing either nitrate of ammonia or sulphuric acid and sulphate of soda. The whole, when tightly closed, is fitted to a curved iron frame, which once set in motion by the hand continues rocking automatically a sufficient time for the production of the ice. The manufacture of artificial ice in most French cities is now carried on upon such a scale that it is scarcely profitable to make use of domestic ice-making machines, which nevertheless appear to have a considerable utility in hot countries where modern ice manufacturing and distributing methods do not exist.

Railway Progress in Northern Nigeria.

With regard to the progress of the railway in Northern Nigeria, it is reported that heavy shipments for the first year's work have been begun, and that 25,000 tons of material will be delivered on the Niger by December. Track-laying will begin in the autumn, and it is hoped that the first section of the main line to Kano, a section of some 150 miles, will be completed by September of next year. Engines and rolling stock for the construction of trains will be at Baro, the commencement of the line, in August. Earthworks on the first section are completed to the seventy-fifth mile, and work is proceeding to mile 100. Unfortunately, progress has been somewhat hampered owing to the exceptionally low water of this and last year. Important schemes regarding land tenure and the deepening of the Niger waterway are now under the consideration of the colonial office.

A Process for Staining Wood.

Hitherto wood has been stained by impregnating it while still fresh, with a solution of some coloring matter. The solution was squeezed into the wood under a high pressure. According to a new Swiss process the wood is impregnated with a solution of a coloring matter in hydrocarbons such as petroleum. For this purpose the wood is placed in a cask filled with the colored solution so as to be completely covered. There it remains until it is thoroughly impregnated by the solution. The staining in the cask may be effected with or without pressure, cold or warm. In this manner it is possible to stain any wood, either fresh or dry.

In Electrical Engineering a description is given of a rotary converter, which is self-synchronizing when thrown upon the line. Starting is effected from the alternating side. To start it, it is only necessary to close the high-tension switch and turn the hand-wheel of a controller first to the starting position and then to the running position. The set can be brought up to speed ready to supply direct current. The machine is provided with an *amortisseur* specially designed to give a good starting torque. It is able to start and run up to synchronous speed with no more than one-fifth of the normal voltage on the slip rings. This low voltage at starting, which is obtained from tappings on the transformer, is an important feature, as it enables the starting current to be kept down to the full load value, and there is no sparking or burning of the brushes during starting, such as commonly occurs when a high-voltage rotary is starting up from the alternating-current side.

THE BRITISH 38-KNOT DESTROYER "SWIFT."

The question of warship speed has been occupying a good deal of attention lately, and general interest in the subject has been considerably quickened by the performance of the United States cruisers of the "Chester" class and of the British "Indomitable." There have been many assertions made as to what ship is entitled to bear the distinction of being the fastest warship in the world; and although such discussions have as a rule been confined to vessels of good sea-going and sea-keeping qualities, the question in its wider bearings has been answered very emphatically by the British special-type torpedo-boat destroyer "Swift." On her preliminary trials this vessel maintained for some hours a speed of 38.3 knots or nearly 45 miles an hour—higher by three knots than the best four-hour performance ever achieved; and by modifying the propellers it may be possible to get a higher speed out of her.

The "Swift" was laid down in October, 1906, at the works of Messrs. Cammell, Laird & Co. at Birkenhead, and was built to the designs of the builders, modified and improved by Sir Philip Watts, the director of British naval construction. Her displacement is exactly double that of the largest torpedo-boat destroyers previously built, namely, 1,800 tons; while her length of 345 feet falls short by only 36 inches of the length of the 10,300-ton United States battleship "Indiana." Her beam is 34 feet 2 inches—slightly less than one-tenth of the length—and the mean draft is 10 feet 6 inches.

The "Swift" is, like all recent British ships, fitted with turbine engines on the Parsons principle, designed to develop the stupendous horse-power, for her size, of 30,000, and to give a speed of 36 knots. The turbines are in two compartments, and drive four shafts with one propeller on each. The furnaces are fitted for the burning of oil fuel only, the carrying capacity being 180 tons; and it is the subject of considerable comment that this is no greater than the quantity carried by the 800-ton 33-knot destroyers of the "Tartar" class, which immediately preceded her. The armament of the "Swift" is limited to four 4-inch (25-pounder) rapid-fire guns and two 18-inch torpedo-tubes.

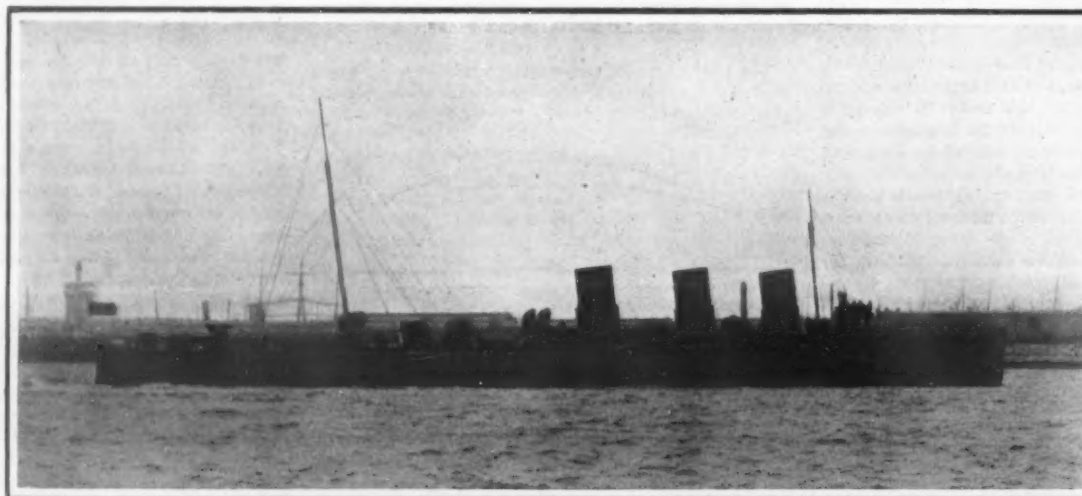
After her speed, the most remarkable feature of the "Swift" is her cost. This amounts, in the case of the hull and machinery, to $1,237,310 and to $14,150 for the armament, a total of $1,251,460. This is a huge price to pay for a vessel of only 1,800 tons and practically without any fighting power, and may be profitably compared with the figures given below for typical cruisers and similar war vessels in the British and in the United States navies.

The greater part of the cost of the "Swift" is, of course, absorbed by her speed; and in this connection it may be interesting to note that if the "Indomitable" had been designed for 23 knots instead of 25, it is estimated that she would have cost $1,500,000 less than she actually did; and that if the "Dreadnought" had been designed for 18.5 knots instead of 21, she would have cost $2,150,000 less. Since Great Britain has four "Indomitables" and eight "Dreadnoughts" built, building, or projected, the total saving would have been no less than $24,000,000—sufficient to build another three battleships.

It is not known whether the British Admiralty intend to repeat the "Swift," but it is regarded as very improbable. At a time when it is so difficult to get money from the government for purposes of national defense, it is likely that the Admiralty will find some more substantial way of spending money than in the creation of speeds which, however startling, have but a very limited military value.

Ship.	Type.	Displacement. (normal)	Speed nominal	Armament.	Cost.
Swift (Br.)	Destroyer	1,800 tons	36 knots	Four 4-in.	$1,251,460
Adventure (Br.)	Scout	2,940 tons	25 knots	Ten 3-in.	1,142,130
Amethyst (Br.)	Cruiser	3,000 tons	23 knots	Twelve 4-in.	1,142,130
Chester (U. S.)	Scout	3,750 tons	26 knots	Two 5-in. Six 3-in.	1,685,000*

* Exclusive of armament.



Length, 345 Feet; Beam, 34 Feet 2 Inches; Mean Draft, 10½ Feet; Displacement, 1,800 Tons; Horse-Power, 30,000; Builders' Trial Speed, 38.3 Knots.

THIRTY-EIGHT KNOT OCEAN DESTROYER "SWIFT," THE FASTEST VESSEL AFLOAT.

THE MARI-KANAVÈ DAM IN SOUTHERN INDIA.

BY THE ENGLISH CORRESPONDENT OF THE SCIENTIFIC AMERICAN.

Recently an interesting water-impounding scheme has been carried to successful completion in Southern India, at the Mari-Kanavè gorge upon the Vedarati River, in Mysore State. Land cultivation in the area abounding the river has hitherto been severely handicapped from the shortness of the rainfall, while the river, unlike those in the northwestern states, receives no reinforcement in its volume from melting snows upon the highlands. The result has been that the agricultural development of the country has been neglected in favor of other parts of the country where the natural watering facilities have been supplemented by a vast network of irrigation channels and canals. Such a state of affairs has adversely affected the revenue coffers and prosperity of the state. The deficiency was realized about a century back and the scheme was advocated of constructing a barrage in the Mari-Kanavè Gorge at the point where the opposite mountain spurs converge, leaving only a narrow passage for the course of the river. For over three-quarters of a century the project was discussed but nothing was attempted in the matter until 1898, when requisite designs were prepared. The plans showed that the scheme could easily be consummated and furthermore at practically little expense. Accordingly official sanction to the scheme was obtained and constructional work commenced in the fall of the same year, and carried on incessantly until its completion a few months ago.

This irrigation scheme is of a "protective" and not of a "productive" nature; that is to say, it is only intended to act as an insurance upon the crops grown in the Chitaldroog district where famine is occasionally experienced. At the present time it is only intended to supply water for some 25,000 acres, but in the near future it may be found advantageous to increase this area when it is ascertained what the catchment area, which is 2,075 square miles in extent and contains several tanks, will yield. The lake that has been formed by throwing the barrage across the mouth of the gorge is one of the largest artificial sheets of water in the world, having an area of 34 square miles and containing 31,000,000,000 cubic feet of water, when filled to its maximum capacity, when there is a depth of 130 feet of water on the up-stream face of the structure.

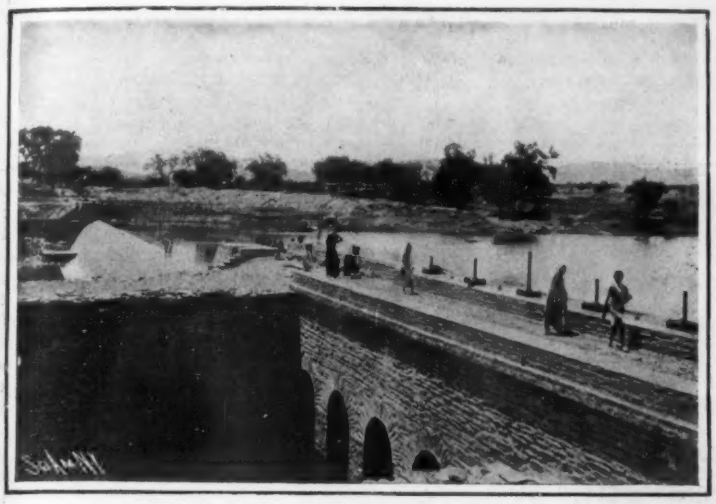
The general design of the barrage may be gathered from the accompanying illustrations. At the point where it is built between the jutting crests of the mountain range on either side the neck of the gorge is about 1,250 feet in width at the level of the roadway of the barrage, in a straight line; but the dam does not extend in a direct line, the slight deviation being necessary to secure the fullest advantage of the hard rock course for the foundations.

The barrage is built throughout of rubble masonry. At roadway level it is 1,350 feet in length, and 142 feet above the bed of the river, while the foundations are carried down to a further depth of 25 feet. At the toe the masonry is 150 feet in thickness, tapering to 15 feet at river level (119 feet) whence it rises perpendicularly to the top. Altogether 6,000,000 cubic feet of masonry have been worked into its construction and under the present head of 110 feet it is practically water-tight.

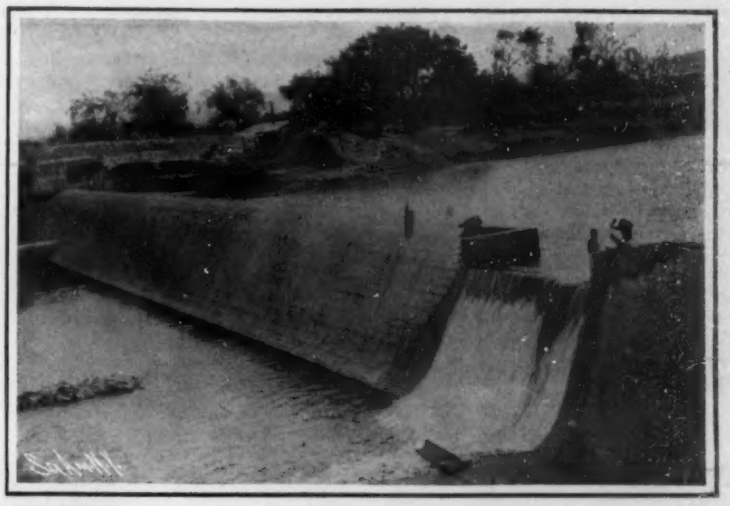
The barrage was constructed exclusively by native labor, and considering its dimensions it is probably one of the cheapest structures of its character that has ever been built, the dam itself costing only $675,000. But little inconvenience or interruption in building was created by the river from the simple fact that for four months in the year it runs very low. In the monsoon seasons the floods were discharged over a temporary weir formed by retaining a section of the dam at a lower level for this express purpose. In view of the fact that it is very probable that water will be required in the near future for electrical purposes, owing to the discoveries of promising gold-bearing ground within 18 miles of the dam, while vast quantities of manganese ore exist in the surrounding hills, it was found necessary to place the out-fall sluices at a height of 60 feet above the river bed in order to secure the requisite head of water for such a hydro-electric project. The water falls from these sluices into the river bed downstream, where it is picked up again by a small dam five miles lower down, where the head sluices are placed and whence the irrigation canals commence. In this manner from 60 to 130 feet of water is rendered available for a 1,000-horse-power hydro-electric station. Although by placing the sluices in the main dam, which are of the Stoney patent type, at a height of 60 feet entails a certain loss of water, such is practically insignificant, since the capacity below this level is only six per cent of the whole.

When constructional work was in full swing over 5,000 natives were employed, and the undertaking offered a novel and interesting example of the cheapness of manual labor as compared with the mechanical appliances. In India there exists a class of laborers generically described as "nowgunnies," or professional stone carriers, who owing to their capacity for hard work are in great demand for such enterprises as this. They are of powerful physique and possess considerable stamina. They will work for ten hours a day and transport from 70 to 150 pounds of stone per man. They form gangs according to the character of the work in hand ranging from 2, 4, 8, 12, to 16 men per unit. How they handle the largest stones may be gathered from the accompanying illustration, and although such transport seems somewhat slow in comparison with the possibilities of handling plants, yet they prosecute their task very energetically, and the scale of pay ranging from 10 to 16 cents per man per day is so low as to render such labor far cheaper than mechanical transport. Indeed, a complete installation of the latter was laid down, a cable being stretched across the gorge over the site bringing the stone direct from the quarries on the hill sides to the site ready for setting; but this had to be abandoned owing to its being far more expensive than the "nowgunny" labor. These men carried the masonry from the end of the railroad track connecting the site of the barrage with the quarries to its destination, and placed it in position. The stone is hematite quartzite.

In the formation of the lake thirty-two villages and farms were submerged, the owners being reinstated on other suitable sites or compensated in money. Among the subsidiary works the most important is an aqueduct 3,000 feet in length built in solid masonry and carried on arches. The irrigation channels radiate on either side of the river from the "anicut" or weir, five miles below the main barrage, for several miles, feeding in turn numerous smaller branch channels. The main canals are 32 feet in width at the water level, tapering with 1 to 1 slopes to 20 feet at the bottom, and carrying a depth of 6 feet of water. Although the maximum depth of the lake is 130 feet on the up-stream side, it is only being filled to 110 feet at present, this being ample for existing necessities. The toal cost of the undertaking has been $1,650,000, of which the barrage itself represents $675,000, and the channels $412,500. Precisely what benefits it will bestow upon the surrounding country may be gathered from the fact that the land was formerly assessed at only 3 cents per acre in many instances. By supplementing the natural rainfall, which is only about 16 inches per year, with water from the lake formed by the barrage, and rendering it possible to raise rice, sugar-cane, tobacco, and other equally profitable crops, the assessment including sufficient water supply for two crops has been increased to $1.30 per acre. That it will result in the land being converted from its existing state of barren sterility to a flourishing agricultural district is already being amply demonstrated.

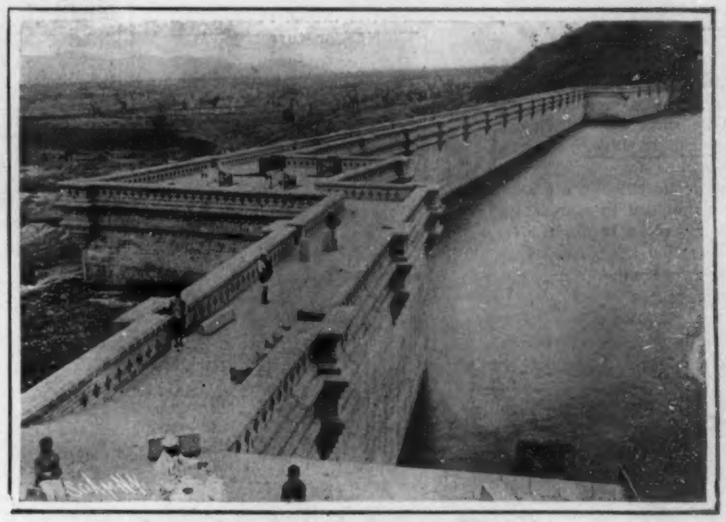


The Left Bank Sluices at the Distributing "Anicut."



The "Anicut" Five Miles Below the Main Dam.

A 28-Foot Cut Through Rock on the Right Bank Distributing Channel.



The Mari-Kanave Dam, 1,350 Feet Long. Maximum Depth of Water, 130 Feet.

Section of Right Bank, Main Channel 30 Feet Wide at Water Level by 20 Feet at Bottom, Carrying Six Feet of Water.

View of the Country Submerged by the Impounded Water of the Vedarati River.

Masonry Aqueduct 3,000 Feet in Length Conveying Water from the Barrage.

THE MARI-KANAVÈ DAM IN SOUTHERN INDIA.

ANTIQUE BRONZE CANNON AT ANNAPOLIS AND WASHINGTON.

BY DAY ALLEN WILLEY.

The cannon collections at Annapolis and Washington embrace marine as well as land artillery pieces used on deck and in fortification, manufactured at some of the most noted gun factories of the Old World. They include parts of batteries on the ill-fated Spanish fleet and guns from land defenses in Cuba; and the war with Mexico, that of 1812, and even the Revolutionary war are brought to mind by the carronade, the mortar, and field guns of antique type. Indeed, so rare and so really artistic are some of the creations of the old-time gunmakers, that it would seem as if these should be more carefully preserved, and at least sheltered from the elements, instead of being exposed in the open as they are, where rain and sun can injure if not obliterate their delicate tracery.

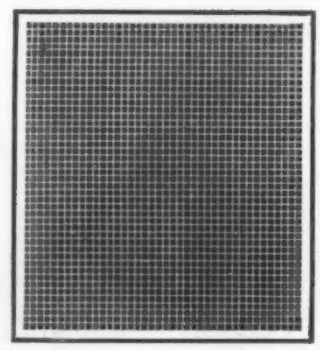
Studying these weapons of the past, one is struck with the care displayed in fashioning and finishing them. The work upon breech and barrel plainly shows that even religion entered into their manufacture; and some of them bear inscriptions showing that they were sent away to the wars with the blessing of the Church.

The contrast between the smooth black tube of to-day without sign or letter and these elaborately chased and scrolled trophies of the past is indeed remarkable. The modern disappearing rifle or turret gun looks peaceful beside one of the older pieces; though the latter is as a child's toy in contrast with the modern weapon, that can hurl its half-ton projectiles some 20 to 25 miles. Perhaps the old Chinese idea of having an instrument of war appear threatening was favored by the European designers, for in the collection we see ships' guns in which the breech was molded to represent the head of a griffin—an uncanny sight to say the least. One of the largest carronades on the Naval Academy grounds has this design. Another has the breech partly finished to represent a human face with great staring eyes, the face standing out of a framework of leaves so distinctly that its appearance is startling. Another piece has the head of an ogre on the breech.

The French and Spanish guns of the seventeenth century were often elaborately named, and bore mottoes in Latin text indicating that they were "cast for the king" or for a "holy war." Several in the American collection bear dates showing that they came from the Seville and other foundries prior to 1650. Each has a name, such as Chevalier or Marquis de ———, its title evidently obtained from some notable family in the country from which it came. The title is usually in raised letters across the barrel near the breech, which leaves ample room for other ornamentation. So nearly all of the brass and bronze pieces are elaborately decorated on the upper parts of the barrels. One favorite design is what appears to be the face of a cherub or angel surrounded by a halo, such as is often seen in religious paintings. Probably the designers took their idea from this, but on most of the guns the work is so beautifully done, that even after the long interval of time which has elapsed, the lines are clear and distinct. The *fleur de lis* is a common ornament, especially on the guns of French workmanship, while exquisitely-chased "collars" encircle the barrel where it enlarges into the muzzle. Even the metal sockets, in which was fastened the rope or chain for controlling the movements of the piece when in action, are molded into artistic designs.

As already stated, some of this ancient artillery dates back to the seventeenth century. In the opinion of ordnance experts, one of the oldest, if not the oldest, is a huge mortar in the Annapolis collection. This is almost as wide as it is long, and has an opening or bore that actually measures 16 inches at its greatest diameter. It is believed to be fully three hundred years old, as judged by its design and the few characters to be traced upon it. Some of the large carronades, mounted at the entrance of the War and Navy Departments and at Annapolis, are 12 feet from breech to muzzle; but their greatest caliber is only about 6 inches, and some of the smaller have but 4-inch caliber. They are made principally of bronze. They are smooth-bore, and though formidable in appearance, they are pygmies in destructive force compared with even the 4-inch rifle of to-day.

Possibly the most historic guns in the collections are two insignificant-looking iron tubes, that stand on guard near the north end of the State, War, and Navy Building in Washington facing Pennsylvania Avenue. Mounted on the stone wall just above the basement, they might be overlooked on account of their small size. They are alike in design and dimensions, being about four feet long, and unlike their fellows, destitute of ornament. On one is the inscription "San Mateo," and on the other "San Marco." These were two of several pieces of artillery captured from the Mexicans by the American fleet operating in the Gulf of Mexico. They were mounted in a battery defending a Mexican port. After the place had fallen into the hands of the Americans, an officer who had noted the quaint appearance of the weapons asked about them, and was told they had been brought to Mexico several centuries before. It is an interesting fact, recorded in the history of La Salle, the explorer, that in his expedition to the New World in 1684, he had as a part of his armament two small guns which the records say were named "San Marco" and "San Mateo." The appearance of the cannon at Washington proves that they are of very ancient workmanship.



AN OPTICAL ILLUSION.

If viewed through a vertical slit, only the horizontal lines show: but if the figure be held close to the eye only the vertical lines appear.

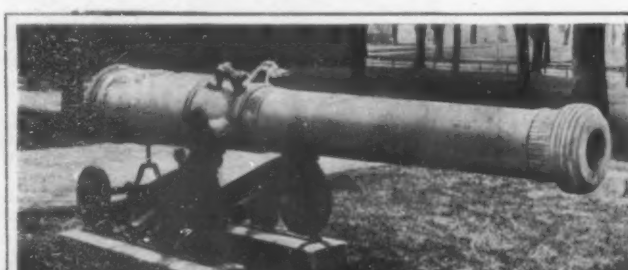
THREE OPTICAL ILLUSIONS.

BY PROF. GUSTAVE MICHAUD, COSTA RICA STATE COLLEGE.

Vision at extremely short distances is of course indistinct, unless a small diaphragm (pinhole or slit) is used to decrease the size of the luminous pencils. If, however, the object observed is sharply divided into luminous and dark masses, its shape may be recognized even when the eye almost touches it. A curious transformation in such cases sometimes takes place. The accompanying drawing apparently shows a dark field crossed by white lines. Yet if, instead of being examined at the ordinary distance, it be placed at about one inch from one eye, this being kept at rest as if looking at some distant object, the figure will be reversed, i. e., dark lines will appear on a white field. Owing to the very small distance between the eye and the figure, the rays emitted by the white lines come to a focus far behind the retina. The convergent beams which have crossed the crystalline lens strike the retina as wide luminous stripes, leaving but very narrow dark boundaries between them. These appear as black lines on a white field.

The other transformations, by far more curious, take place when the same figure is seen through a narrow slit made with a single stroke of a penknife into a piece of dark-colored pasteboard. The slit is kept all the time vertical, close to one eye, the other eye being shut. The figure, thus examined at a distance of about one inch, will appear to be made up entirely of vertical lines, the horizontal lines having apparently vanished. Vision in that case is distinct. The vertical lines are seen nearly as sharply as in the case of vision at ordinary distances. This is not extraordinary if it be borne in mind that the slit decreases the width of the luminous pencils, and prevents the formation of diffusion circles in a horizontal direction only. It acts as a diaphragm for the vertical lines, and renders no such service to the horizontal lines. But if the figure be now withdrawn to the distance of one or two feet, the slit remaining in the same vertical position and all the other features of the experiment remaining unchanged, it will be found that the horizontal lines, which had vanished, have reappeared, while the dark, sharply-cut, vertical lines have entirely disappeared. At a distance of one inch the figure was exclusively made of vertical lines; at a distance of one foot it contains horizontal lines only.

Diffraction is the agent of the queer transformation. The rays which have passed through the narrow slit interfere, and the result of their interference is a general blurring and blending of the vertical lines. When these were at but a small distance from the eye, their image was large enough to remain quite distinct in spite of a slight blurring of the edges. But as the distance increased, the image became smaller and the blurring relatively more and more important until it caused the image to disappear. As to the horizontal lines, the extension of the slit in the vertical direction is such as to prevent diffraction from blurring their horizontal edges. Moreover, they are now at the distance of distinct vision, and their image is clearly formed right on the retina without any diaphragm.



Old Highly-Decorated Spanish Gun.

An Odd Breech.

Cannon With Griffin's Head Breech.

Mortar Three Centuries Old.

These Two Guns Are Believed to Have Been Brought to America by La Salle, the Explorer, in 1684 and Named After Two of the Evangelists.

ANTIQUE BRONZE CANNON AT ANNAPOLIS AND WASHINGTON.

THE NEW DAVIS PROJECTILE TORPEDO.

Briefly stated, the difference between the standard Whitehead torpedo and the new Davis torpedo which recently underwent a very successful test is that the first carries a charge of gun cotton which is detonated against the side of the ship at the instant of contact, whereas the latter carries, in addition, a smokeless-powder gun which at the instant of impact discharges a high-explosive shell into the interior of the ship where it is exploded by a short-time fuse. The destructive effects of the Whitehead torpedo are not as widespread nor so fatal as the great size of the charge, amounting in the latest torpedoes to over 200 pounds, would lead us to expect. In the Russo-Japanese war, ships that were struck by torpedoes were able to proceed to port, or move into some desired position for repairs, under their own steam. The disparity between the size of the charge and the extent of the damage is due to the fact that the energy of the gun cotton is let loose on the outside of the ship, immediately at the skin plating. The latter is, of course, subjected to widespread damage, a large rent being invariably torn in the side of the ship; but it frequently happens that the damage is practically confined to the outer skin; the walls of the inner compartments proving sufficiently strong to resist the rush of gas and prevent the passage of any considerable amount of water beyond the one compartment affected. The object aimed at in the new torpedo, which is the invention of Lieut.-Com. Cleland Davis, U. S. N., is to attack not merely the outer skin of the ship, but the vitals of the ship itself—to enable the torpedo to carry its high explosive charge, or a portion of it, through the inner bulkheads of the ship, where it can be detonated with correspondingly greater destructive effect.

The means by which the above results are secured are shown very clearly in the accompanying diagram, Fig. 1, which represents approximately the interior construction of the forward portion of the torpedo. At the front is the usual war head. Back of this is a section provided with two diaphragms, *A* and *B*, in which is mounted a light gun of large caliber, with a length of ten calibers, whose walls are less than an inch thick and which weighs less than 350 pounds. It is built of a vanadium steel for which a strength of nearly 250,000 pounds to the square inch is claimed, and it is the great strength of this metal in proportion to its weight which has rendered it possible to mount such a gun in a torpedo, and yet keep within the limits of prescribed weights and proper balance. The gun is loaded with a charge of smokeless powder and with a high-explosive projectile *D*. In the photograph, Fig. 3, showing the complete torpedo ready for firing, there will be noticed projecting from the war head a short horizontal spindle provided with a small screw propeller. The instant the torpedo enters the water, the propeller begins to revolve on the spindle, and in so doing sets the mechanism in the proper position for firing the gun at the moment of contact of the torpedo with the side of the ship. At the instant the torpedo strikes, the powder charge within the gun is ignited, and the projectile driven forward into the interior of the ship. If no fuse is employed, the shell will pass entirely through the vessel; but if a short-time fuse is adjusted, the shell may be detonated at any desired distance within the vessel, say either in the center of the boiler room, or in the engine room or magazine, where its fragments will necessarily cause a large amount of damage. Also, t'e passage of the shell and its explosion will serve to open several of the compartments of the ship, and involve the flooding of a larger area than would be possible, or at least probable, if the torpedo were one of the ordinary type.

By the courtesy of the inventor we are enabled to present several photographic views and diagrams, showing the results of a test recently carried out at Fort Strong, Mass. The cylindrical caisson shown in Fig. 5, and in the diagram, Fig. 2, was built to represent roughly the interior structure of a warship below the waterline. The barge from which the torpedo was fired was moored 120 feet from the target. The torpedo was slung on a trolley wire, which was stretched from the barge to the target, in order to insure an accurate hit. The experiment was eminently successful. A huge hole was torn in the front face of the target, and the projectile passed through four separate steel bulkheads, each about half an inch in thickness; passed out through the other side of the target; and landed in the mud 175 feet beyond. The reaction of the explosion drove the after part of the torpedo with the gun attached 40 feet to the rear, and the cylindrical portion of the torpedo which had inclosed the gun was driven 25 feet backward. The projectile did not explode, but even in this case the value of the gun was proved in its cutting a hole entirely through the structure, as is shown in the photograph of the caisson taken after the attack.

Perhaps the most interesting of the photographs is that taken at the instant the torpedo struck, which shows in the photograph the faint white line of the wake of the approaching torpedo, the upward rush of the water and gases, and the very distinct white streak beyond the target, marking the course of the shell after it had passed through.

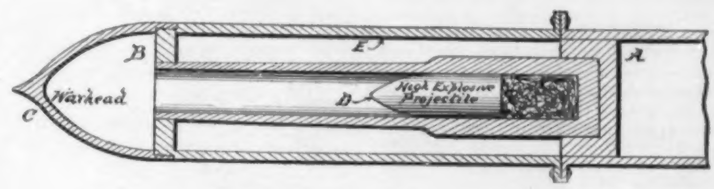


Fig. 1.—Section of Forward Portion of Torpedo, Showing the Gun with Its Projectile and Powder Charge.

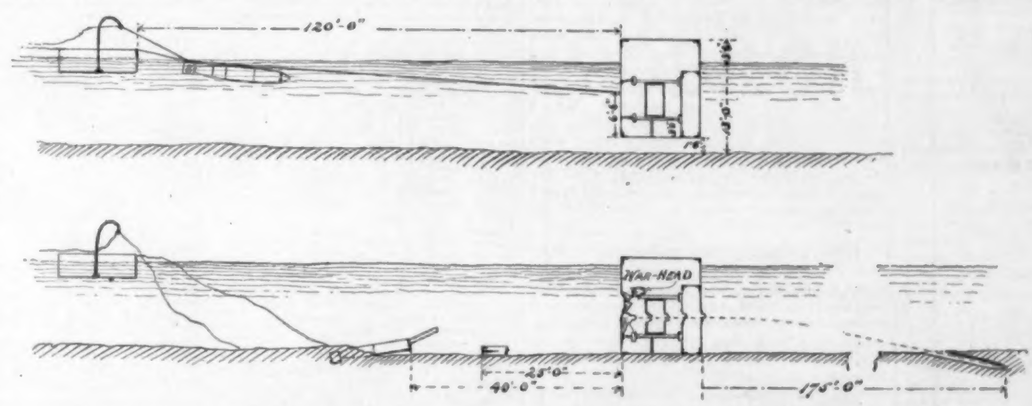


Fig. 2.—Diagram Showing the Trolley Wire by Which the Torpedo Was Directed to the Target, and the Condition of Target and Torpedo After the Attack.

Fig. 3.—The Projectile Torpedo Ready for Firing.

Next to gold, petroleum is the most valuable mineral product of California.

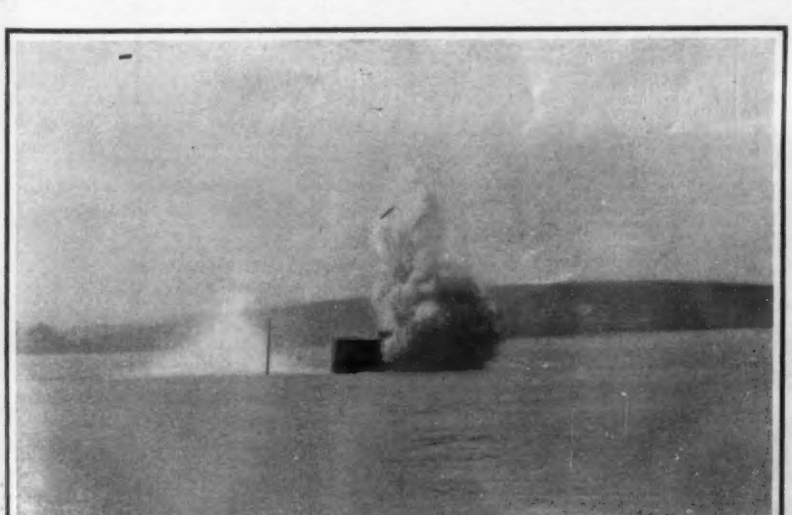


Fig. 4.—Instantaneous Photograph of the Attack. Note the Wake of Shell to Left, After It Has Passed Through Target.

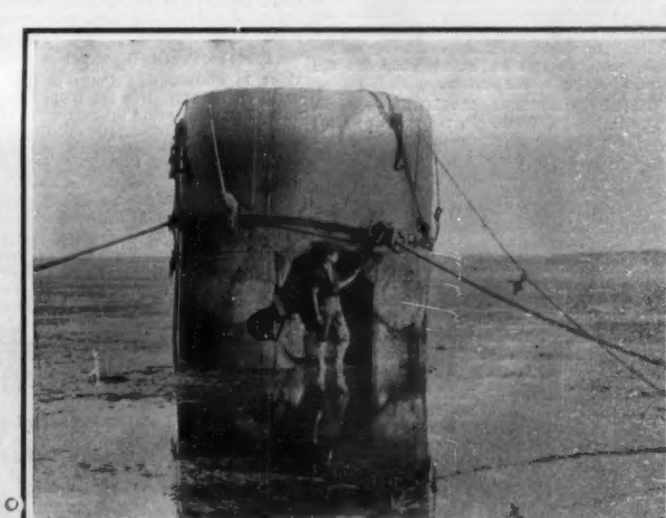


Fig. 5.—Target After Attack; Front Blown Away, and Hole Made by Shell Near Right Hand of Boy.

THE NEW DAVIS PROJECTILE TORPEDO.

RECENTLY PATENTED INVENTIONS.

Pertaining to Apparel.

SWEAT-BAND.—T. J. Asch, New York, N. Y. The invention refers to hats and other head coverings, and its object is to provide a new and improved band for head coverings, notably straw hats, soft and stiff hats and the like, and arranged to bear softly on the head of the wearer and to readily conform to the configuration of the head.

Heating and Lighting.

THERMOMETER AND OTHER SIMILAR DEVICE HAVING SATURATED VAPORS.—J. B. Fournier, 62 Quai des Orfèvres, Paris, France. The invention relates to improvements in devices in which the part sensible to heat incloses a saturated vapor the tension of which has for its purpose to act as a manometer or other member sensible to the pressure, located at any distance from the said part sensible to heat. It is closely associated with other inventions described in Mr. Fournier's formerly filed applications. The purpose of the said improvements is to locate on a predetermined length the part of the apparatus which is sensible to heat.

Of General Interest.

LIGHTNING-ROD TERMINAL.—J. P. Turner, New York, N. Y. The object here is to provide for the speedy dissipation of the current, whereby danger of the rod being overcharged and melted is avoided. This is accomplished by passing the rod through a substantially horizontally disposed tapering perforated body filled with charcoal and having branch conductors leading from its enlarged end. The perforations permit the water to seep through, maintaining the terminal in a high state of conductivity.

SCALE.—J. W. Free, Swissvale, Pa. In this case the invention pertains to scales used for determining sizes of tools, wire, sheet material, and the like, the more particular object being to provide a construction having intelligible characters placed thereon and admitting of a large variety of general uses.

AIR-CUSHION FOR HORSESHOES.—J. H. Fawkes, Detroit, Mich. This invention comprises a substantial ring shaped shoe of suitable material, secured to the hoof of the horse by the usual nails. A clamping ring fits within the shoe, the ring being secured to the shoe by screws. A resilient bag is arranged within the clamping ring, and a cover of leather or fabric material is placed over the bag, the edges of the cover being inserted between the ring and the shoe.

Machines and Mechanical Devices.

COMBINATION-LOCK FOR DOORS.—D. E. Lombard, New York, N. Y. The invention pertains to certain improvements in combination locks for doors, and more particularly to that type of lock in which the door may be opened from either side by independent operating members, one of which includes a mechanism which must be operated in a particular manner in order to withdraw the lock bolt.

WOODWORKING-MACHINE.—C. L. Hartwell, Chicago Heights, Ill. The invention contemplates a machine for turning irregular or non-circular forms, the machine being more especially designed for shaping the eye portion of ax and other handles, although it is not limited to this particular operation, as it may be used with advantage in the shaping of other articles.

CARVING-MACHINE.—W. F. Mangels, New York, N. Y. This machine accurately and quickly reproduces in wood or other materials a plurality of parts simultaneously, according to a pattern. When the parts are in position and the motors running, the operator takes hold of the holder and moves the pointed head of the tracer toward the pattern, so that the revolving carving tools come in contact with and cut the blocks, the tools used being roughening tools, to give an outline shape to the block according to the pattern.

SHAFT-POLISHING MACHINE. — J. S. Griffin, Roslyn, Wash. In the present patent the invention has reference to machinery for use in polishing shafting; and the object of the improvement is the production of a machine of this class which is simple in construction, and which is provided with automatic means for feeding the shaft to the rolls.

MECHANICAL MOVEMENT.—W. Sullivan, Hot Springs, Ark. The object of this inventor is to provide a new and improved mechanical movement for converting reciprocating motion into a rotary motion in a very simple and effective manner. The movement is durable in construction, composed of comparatively few parts, and not liable easily to get out of order.

EARTH SCRAPER—J. E. Tucker, Jennings, Kan. The invention relates to that class of scrapers and excavators which are employed for handling or transferring masses of earth, sand and other material from one point to another along the surface of the earth by being dragged back and forth between two points from the action of cables winding on spools which are turned by separate frictions and so constructed that either may receive power separately while the others are released.

Note.—Copies of any of these patents will be furnished by Munn & Co. for ten cents each. Please state the name of the patentee, title of the invention, and date of this paper.

Notes and Queries.

HINTS TO CORRESPONDENTS.

Full hints to correspondents were printed at the head of this column in the issue of August 8th, or will be sent by mail on request.

(10840) W. M. asks: Please inform me the meaning of the term three-phase or single-phase, speaking in this case about alternating electric currents. Kindly explain the difference in the two. A. When a dynamo produces three e. m. f.'s 120 deg. apart, three currents result with suitable wiring. Such a current is three-phase. If but a single e. m. f. is produced, the resulting current is a single phase. Full explanation of the features of alternating currents, and all electrical currents and apparatus, is to be had in Sloane's "Handy Book of Electricity," which we send for $3.50, and which is indispensable to workers with electricity.

(10841) G. H. H. says: Will you kindly tell in your Notes and Queries column why the sun and the moon when they appear near the horizon are apparently so much larger than when farther up in the sky? A. The great apparent size of the sun and the moon when seen near the horizon is due to the fact that we contrast them in this position with terrestrial objects, and their greater distance impresses the mind with their great size. With a measuring instrument the optical illusion vanishes. The moon measures slightly larger when high in the sky than when on the horizon, since she is then about one-sixtieth nearer the eye than when on the horizon. For this see Todd's "New Astronomy," which we send for $2 by mail.

(10842) A. S. asks: If a cubic hole were dug in the center of our earth about 8 x 8 x 8 feet, and a man could be in the hole, how would he know whether his head were up or down, or he were lying down or standing upright? A. If a man were in a hole at the center of the earth he would not know which direction was up or down; there would be no such thing as direction. This would be the case, without reference to the size of the hole, even if it were thousands of miles across. If the earth were hollow, a body anywhere in the hollow would be equally attracted in all directions and would lose the sensation of weight or gravitation. All directions would be the same to him.

(10843) A. J. Z. says: 1. Is there any method known, theoretical or practical, by which intense heat may be transmitted a distance of say twenty feet by other means than that of heating an agent and transferring the heated agent to the desired spot? A. There is probably no way in which an intense heat may be transmitted twenty feet from the source of heat. The heat of the sun may be reflected, but any terrestrial heat is too feeble for such transmission. 2. When a sunbeam is reflected by a mirror, how much, if any, of the heat is reflected with the light? A. The heat of the sun's rays is always reflected with the light. What part of the whole amount is reflected depends upon the material of the reflector. In this matter quite different results have been reached by different investigators, so that any figures must be taken with allowance, as being to a degree uncertain. All agree that lampblack reflects no heat. Water too may be taken to reflect none. Glass reflects about 10 per cent; polished iron about 75 per cent; polished copper about 85 per cent; polished gold and silver about 97 per cent. The solar motor in California is run by steam produced by boiling water with the heat of the sun which has been reflected by glass plates upon the boiler.

(10844) S. G. B. says: Am I not right in stating that the revolution of the earth on its axis gives the Dipper the appearance of moving around the north star in twenty-four hours? A. The rotation of the earth upon its axis causes all the stars of the sky to appear to move around the north and south poles of the sky each day. The Dipper has this motion with all the other stars. The rotation of the earth is from west towards the east, and the stars appear to move from east to west, rising in the east and setting in the west. Those stars near the north pole with us do not set nor rise, but move toward the east in the lower part of their motion and towards the west in the upper part.

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FOR SALE.—Patent No. 886,389, issued May 5, 1908. A fish-tail propeller. Reduces friction to a minimum, giving greater obtainable speed than ordinary propeller, with reduced coal consumption. I have sole United States patent right over same. Address Frank S. Merrow, Apartado No. 654, Mexico City.

Inquiry No. 8628.—Wanted to buy paving block machines for use with partly fluid substances.

CHEAP FOR CASH.—Grob's folding fire hose bridge. Patent No. 886,798. Patented May 5, 1908. For full particulars address Robert C. Grob, 446 Wabasha Street, St. Paul, Minn.

Inquiry No. 8630.—Wanted to buy file cutting machinery.

FOR SALE.—Patent No. 776,482. Pyrographic pencil exciter and regulator. For full information address owner, J. Anderson, 119 Beach Avenue, Chicago, Ill.

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PATENT No. 870,940. Patented November 12th, 1907. Folding Stepladder. Dies and sample ladders made. A. Dahl, 322 W. 144th Street, New York.

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WANTED.—Man, must be willing to learn and capable of acting as our local representative. No canvassing or soliciting. For particulars address National Co-operative Realty Co., Dept. I. B. Z., Washington, D. C.

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COMPLETE LISTS of manufacturers in all lines supplied at short notice at moderate rates. Small and special lists compiled to order at various prices. Estimates should be obtained in advance. Address A. A. H., Box 773, New York.

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Inquiry No. 8738.—For parties manufacturing casein cement.

Inquiry No. 8742.—For manufacturers of water still, also of thermometer tubing.

Inquiry No. 8746.—For dealers in paper and cardboard making machines.

Inquiry No. 8748.—Wanted to buy polished or lacquered brass in sheets 29 gauge, quarter hard in temper.

Inquiry No. 8749.—For makers of very large springs, used for running machinery.

Inquiry No. 8751.—For manufacturers of brass, tea, dessert and table spoons for silver plating.

Inquiry No. 8752.—For manufacturers of paper mill machinery for the manufacture of strawboard and wrapping paper.

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Inquiry No. 8759.—For a firm to do porcelain enameling of ventilator tops, such as used on the outside of arc lamps.

Inquiry No. 8761.—Wanted to buy a small carriage propelled by electricity so that a lame person may get about by himself.

Inquiry No. 8766.—For parties making pressed paper goods.

Inquiry No. 8769.—For manufacturers of an appliance to attach to the old style razor blade to make same a safety razor.

Inquiry No. 8770.—For parties who make short link twist chains, links from ⅛ inch up.

Inquiry No. 8771.—Wanted to buy tune sheets for Criterion music boxes.

Inquiry No. 8774.—For machinery for making bags from sisal hemp.

Inquiry No. 8775.—Wanted to buy stock novelty or jewelry catalogues.

Inquiry No. 8778.—For manufacturers of reapers, binders and mowers.

Inquiry No. 8779.—For parties manufacturing gas, gasoline, steam engines and boilers; also packing and mineral wool, steam supplies, iron and lead pipe, power transmission machinery and steam fitters' tools.

Inquiry No. 8780.—For parties who make gasoline stoves.

Inquiry No. 8783.—For manufacturers of small drummer's traps as whistles, rattles, rooster crows, etc.

Inquiry No. 8784.—For manufacturers of alcohol burners for lights and stoves.

Inquiry No. 8786.—For parties to manufacture glass balls blown about 1½ inch in diameter with a ⅛ inch hole through the center, should hold about 200 pounds to the square inch of steam pressure.

Inquiry No. 8787.—For parties who manufacture cat-gut.

Inquiry No. 8790.—For the manufacturer of "Brooks improved hand pump."

Inquiry No. 8792.—For a firm that manufactures glass holders made of glass.

Inquiry No. 8794.—For manufacturers of the "Ideal Dust Pan."

Inquiry No. 8795.—For a mechanical device for catching or destroying flies, mosquitos, etc.; also traps for catching snakes.

Inquiry No. 8796.—For concerns manufacturing stills adapted to the manufacture of denatured alcohol.

Inquiry No. 8797.—For manufacturers of fiber.

Inquiry No. 8798.—For manufacturers of micro lens used in small articles such as pencils, charms, etc.

Inquiry No. 8799.—Wanted to buy new or second-hand box nailing machine for small packing cases.

Inquiry No. 8800.—Wanted complete data in regard to pegamoid.

Inquiry No. 8802.—Wanted to buy machinery for cutting and polishing oilstones, whitestones or grindstones.

Inquiry No. 8803.—For manufacturers of files, screws, druggists' supplies, hardware in general, and agricultural machinery.

Inquiry No. 8804.—For parties dealing in windmills, wood split pulleys, wheelbarrows, cutlery and picks.

Inquiry No. 8805.—Wanted to buy outfits and supplies for brazing.

Inquiry No. 8806.—For manufacturers of drawing materials.

Inquiry No. 8807.—For dealers in second-hand cotton machinery.

Inquiry No. 8808.—For manufacturers of machinery for making bungs for barrels.

Inquiry No. 8809.—For the manufacturers of metalized flowers used for hat pins, etc.

Inquiry No. 8810.—For makers or importers of porous water bottles or jars to cool drinking water by evaporation.

Inquiry No. 8811.—Wanted to buy electric tattooing needles, inks and stencils.

Inquiry No. 8812.—Wanted to buy outfits for manufacturing fuel briquettes from sawdust.

Inquiry No. 8813.—For manufacturer of the "Steele" mixer for mixing food products, etc.

Inquiry No. 8814.—Wanted to buy hand lever air pumps, 100 lbs. pressure.

Inquiry No. 8815.—Wanted to buy carriage and wagon hardware, coal, iron and steel.

Inquiry No. 8817.—For a firm that forms small articles of wire, also a firm to make wooden rings about 3 or 4 inches in diameter.

Inquiry No. 8818.—Wanted to buy specialties in large quantities.

Inquiry No. 8819.—For manufacturers of Excelsior Welding Compound.

Inquiry No. 8820.—Wanted to buy pressed fiber boards 1 foot wide and from 1-16 to ¼ inch thick.

Inquiry No. 8821.—Wanted to buy machinery for making a rough composition board, something like a straw board.

Inquiry No. 8822.—For manufacturers of dredging machinery to be operated by gas engine.

Inquiry No. 8823.—For manufacturers of crepe paper and paper novelties.

Inquiry No. 8824.—For a firm to design and build an automatic machine for making finger shields.

Inquiry No. 8825.—For manufacturers of a new device to split wood.

Inquiry No. 8826.—Wanted to buy small fuel compression machines both manual and engine power.

Inquiry No. 8827.—For manufacturers of annealed glass.

Inquiry No. 8828.—Wanted to buy thin, highly tempered steel for safety razors.

Inquiry No. 8829.—Wanted to buy machinery for making pins, hair pins, hooks and eyes.

Inquiry No. 8830.—Wanted to buy machinery for making brushes and baskets.

Inquiry No. 8831.—Wanted to buy knitting machines.

Inquiry No. 8832.—Wanted addresses of high-grade label weavers, preferably in New York.

Inquiry No. 8833.—Wanted to buy a peanut shelling machine.

Inquiry No. 8834.—Wanted to buy a 2-horse-power gasoline engine for spray wagon working on hilly ground.

Inquiry No. 8835.—Wanted to buy toothpick machinery.

Inquiry No. 8836.—Wanted to buy decorticating machines for sisal.

Inquiry No. 8837.—Wanted to buy folding umbrellas.

Inquiry No. 8838.—Wanted to buy metallic targets similar to clay birds used in shot-gun shooting.

Inquiry No. 8839.—Wanted to buy cheap automobiles.

Inquiry No. 8840.—Wanted to buy portable hydro-carbon pressure lamps.

Inquiry No. 8841.—Wanted to buy lunch counter and restaurant fixtures.

Inquiry No. 8842.—Wanted to buy annealed glass.

Inquiry No. 8843.—Wanted to buy cigarette making machine.

Inquiry No. 8844.—Wanted to buy inkstands.

Soldering machine for commutators, H. Stone 896,951
Sound records, making, W. H. Hoyt 897,254
Sound reproducing machines, repeating mechanism for, J. H. Stinson 896,950
Spacing table, H. A. Feindt, Jr. 897,199
Spoke socket, sheet metal, F. S. Loockerman 896,735
Spraying apparatus, H. F. B. Snyder 897,029
Square, carpenter's bevel, C. M. Hoeregott 897,104
Stake holder, A. J. Bostwick 897,249
Stamp mill, rotary, P. J. Lonergan 897,214
Stamping and franking letters, telegrams, etc., machine for use in, E. Moss 897,004
Steam trap, C. E. Fagan 896,815
Steam trap, W. F. Sayles 897,022
Steel sheet, composite coated, E. Norton 896,751
Steering gear, T. Mayhew 896,844
Sticker head attachment, J. Kridler 897,210
Stock releaser, J. A. Cahill 897,192
Stone sawing machine, Wegner & Meyers 896,782
Storage battery, T. A. Edison 896,812
Store service apparatus, C. W. McCormick 896,747
Strain equalizer, J. W. Wash 897,040
Strainer, liquid, D. H. Mosteller 897,005
Street cleaning push cart, J. H. Byram 896,799
Strip-serving device, H. P. Roberts 897,258
Stuffing box, A. E. Taylor 896,870
Supporting or display rack or stand, M. E. Hill 896,990
Tack puller, lasting, L. V. Miller 897,003
Tags and automatically attaching them to plugs of tobacco, machine for making, W. E. Martin 897,001
Tank alarm, pressure, J. M. Latimer 896,841
Tantalum, hardening, W. von Bolton 896,705
Tap, collapsible, A. Granstrom 897,088
Tapes of paper or other material, holder for, A. A. Grand 897,086
Telephone apparatus, S. A. Beyland 896,796
Telephone exchange system, H. G. Webster 897,233
Telephone meter, N. H. Holland 896,830
Telephone repeating apparatus, circuit system for, H. E. Shreeve 897,028
Telephone signal, C. Mahler 897,119
Telephone switchboards, spring-jack for, G. Grabe 897,085
Telephone system, J. J. Kelly 896,836
Telephone system, A. H. Weiss 897,042
Telephone system, H. G. Webster, 897,232, 897,234 to 897,243
Telephone transmitters, appliance for use with, O. H. Goodrich 897,084
Testing device selective mechanism, A. B. Herrick 896,828
Thermometer holder, L. R. Edwards 897,075
Thermostat, J. Nelson 896,748
Threshing machine, W. Stephenson 897,030
Ticket holder and cutter for ticket agents, A. D. Joslin 896,918
Ticket record and train check, manifolding, J. O. M. Seibert 897,025
Ticket selling machine, Mayo & Houlehan 897,217
Ticket transfer, C. D. Meneely 896,845
Tile handling apparatus, drain, E. Raye 896,758
Tiling tool, adjustable, C. W. Young 896,879
Tilting bin, E. H. Grant 897,087
Tire, automobile or vehicle, G. Knadler 897,209
Tire, pneumatic, W. C. & L. T. Rocheleau 897,151
Tire pump, J. A. Dyblie 896,902
Tire tread grip, vehicle, C. L. Hoff 896,728
Tongs, grappling, T. T. Shaw 897,163
Tool, combination, W. B. McCarty 896,746
Tool, pneumatic, W. H. Keller 897,107
Tooth cement, production of, F. Schoenbeck 897,160
Toy and educational block, combination, O. S. Perkins 897,137
Track brake, electric, W. C. Mayo 896,740
Track level, B. F. Young 897,045
Tram lines, shifting point for, O. Coates 897,061
Transformer core construction, J. J. Frank 896,983
Transmission mechanism, C. E. Duryea 897,261
Trap. See Steam trap.
Tray tool, E. Ekstrom 896,813
Trolley wheel, roller bearing, W. L. Cooksey 897,063
Truck, car, W. C. Mayo 896,741
Tube cleaner, J. G. McCarren 896,851
Tube receiving or delivering mechanism, Webster & Clark 896,781
Tubes, method and apparatus for making, H. W. Hock 896,991
Turbine, J. O. Purvis 896,757
Turbines, stuffing box for elastic fluid, G. Belluzzo 897,189
Turn table operating mechanism, C. E. McWade 896,931
Turpentine cup, E. A. McKoy 897,126
Twine machine, grass, K. Wessel 896,783
Type casting machine, A. W. Hanigan 896,908
Typewriting machine, B. A. Brooks 896,707
Typewriting machine, O. Woodward 896,789
Typewriting machine, Barney & Steele 896,791
Typewriting machine, W. W. Hopkins 896,913
Typewriting machine, E. C. Dunbar 896,977
Typewriting machine, W. E. Barnard 897,248
Typewriting machine ribbon feed mechanism, E. B. Cram 896,863
Umbrella, foldable, J. E. Hannon 897,096
Umbrella, folding, T. J. Dague 897,195
Umbrella runner and notch, W. M. Seitzinger 897,026
Uterine supporter, G. Beck 897,050
Valve, F. Freeman 897,078
Valve alarm attachment, R. F. Spamer 896,864
Valve, flushing, W. H. Ludewig 897,116
Valve for hydraulic machines, W. Astfalck 897,047
Valve mechanism, flushing tank, W. H. Ludewig 897,117
Valve mechanism, sand, D. T. Barnett 896,968
Valve, relief, F. C. Roberts 896,939
Valve, steam engine, F. M. Rutledge 896,943
Vehicle canopy top, J. E. Smith 896,863
Vehicle, motor, T. L. & T. J. Sturtevant 897,230
Vehicle wheel, H. Cramer 896,897
Vending machines, coin-way for, H. J. Wissing 896,965
Veriscope, W. H. Ely 896,814
Vessel, containing and dispensing, C. F. Kade 897,106
Vessel, turret, C. D. Doxford 896,900
Violin, P. A. Amundson 896,790
Violin or other string instrument body, S. Ulbrich 897,036
Violin rest, A. A. Goldenberg 896,721
Vise, bench, O. A. Anderson 897,185
Voting machine, C. W. Bowron 897,056
Vulcanizer, J. F. Hardy 896,989
Wagon brake, Heath & Story 896,910
Waist, E. M. Shively 897,165
Wantage gage, M. A. Rutenber 896,761
Washing machine actuating mechanism, J. Edens 897,074
Washing machine gearing, A. F. Victor 896,960
Watch pocket, safety, M. E. Brown 897,058
Water gage, T. R. Whittaker 897,180
Water gage, S. Donnersberg 897,198
Water heater, electric, J. R. Ayotte 897,186
Water, purifying and filtering, A. Vogelsang 897,039
Water wheel, W. P. Spooner 896,867
Wells, gas trap for oil, R. C. Baker 896,967
Wind wheel, A. M. Pacey 897,132
Winding machine, quill or cop, E. E. Bradley 897,191
Windows, construction of wrought iron, A. Filzamer 897,077
Wire stretcher, C. M. & H. A. Ruggles 896,760
Wire stretcher, W. G. Matson 896,927
Wood trimming machine, E. P. Webster 896,872
Wrapping thread, braid, etc., card for, R. W. Strassberger 897,173
Wrench, R. F. Bowers 897,055
Wrench, G. Ebenhoch 897,071
Writing machine, J. R. MacGuffie 896,925
Yoke, neck, H. L. Kingsley 896,732

DESIGNS.

Badge, T. Metzeler 39,456
Badge, H. Zink 39,457
Brooch, F. Deman 39,458
Brooch pin, H. W. Fishel 39,459, 39,460
Brushes, mirrors, or similar articles, back for, H. J. Herbert 39,450, 39,451

Mirrors, brushes, or similar articles, back for, H. J. Herbert .... 39,452 to 39,455
Picture frame, F. Jandt 39,463
Sign, street, E. J. Bliss 39,465
Telephone cabinet, A. Larsson 39,464
Type, font of, T. C. Robinson 39,466, 39,467
Watch fob, C. H. Bunting 39,461, 39,462

TRADE MARKS.

Axes, adzes, hay knives, etc., J. B. Hasenclever & Sohne 70,345, 70,346
Baking powder, Sterling Supply Co. 70,402
Batteries, dry, American Electric Telephone Co. 70,385
Belts, women's leather, R. H. Macy & Co. 70,417
Boot and shoe lasts, Woodard & Wright 70,406
Boots and shoes, leather, C. J. O'Keefe 70,334
Boots and shoes, leather, Isaac Prouty & Co. 70,351, 70,378
Brick, Straitsville Impervious Brick Co. 70,421
Butter, renovated, Scott & Co. 70,338
Cake icing, L. Benjamin 70,323
Calendars, W. T. Doremus 70,367
Canned fruits and vegetables, tapioca, cornstarch, and extract of vanilla, H. Kussy. 70,415
Chemical, certain, Chemische Werke Hansa, Gesellschaft mit beschrankter Haftung .. 70,391
Cigars, Jones Dry Goods Co. 70,397
Cigars, cheroots, and little cigars, Mendel & Co. 70,399
Cleaning compounds, soaps, and metal polishes, F. Conde 70,341
Coal, Elmore-Fort Co. 70,343
Coffee, Reliable Tea Co. 70,420
Compound, certain, J. Ellmore 70,344
Cotton duck, John Boyle & Co. 70,412
Dress shields, I. B. Kleinert Rubber Co. 79,371
Feed, poultry, M. C. Peters 70,336
Felt roofing, sheathing, and building paper, Barrett Manufacturing Co. 70,358, 70,359
Filters and filtering materials, L. Anker 70,357
Flour, wheat, S. Hamill Co. 70,337
Flour, wheat, Durst Milling Co. 70,342
Food, stock, M. C. Peters 70,419
Gelatin, Crystal Gelatine Co. 70,410
Ginseng compound, N. B. Mattle 70,418
Glass globes for lights, Fostoria Glass Specialty Co. 70,368
Glove and dress fasteners and buttons, Fownes Brothers & Co. 70,324
Hardware, certain, J. B. Hasenclever & Sohne 70,362, 70,363
Hosiery, E. Blood 70,340
Hosiery, T. L. Seidel 70,356
Lamps, miners', G. Anton 70,364
Machines, certain, Birmingham Small Arms Co. 70,339
Mattresses, Longview Crate and Woodenware Manufacturing Co. 70,374
Medicines, blood purifying and tonic, Peck Johnson Co. 70,382
Medicines, certain, Collins Medicine Co. 70,393
Medicines for the treatment of certain diseases, F. Schmid Chemical Co. 70,400
Metal polish, Levering, Murray & Hanlon 70,352
Milk, John Wilde Evaporated Milk Co., 70,413, 70,414
Molasses, Pacific Coast Syrup Co. 70,335
Nail polish, A. A. Vantine & Co. 70,380
Oil, olive, Macaluso Bros. 70,353
Oiling roads, preparations for, American Tar Co. 70,388, 70,390
Outlet, switch, and conduit boxes, W. H. Colgan Co. 70,392
Paints, liquid mixed, Farquhar & Gill 70,394
Paper, roofing, E. E. Smith 70,377
Paper, writing, H. Lindenmeyr & Son 70,398
Pencils, paper, pens, and files, I. Upham Co. 70,405
Perfume extracts, A. A. Vantine & Co. 70,384
Perfume extracts and toilet waters, A. A. Vantine & Co. 70,381
Perfumes, perfume extracts, and toilet waters, A. A. Vantine & Co. 70,383
Pickles, E. E. Kidd 70,379
Piece goods, certain, J. Lonke 70,416
Pills, Allcock Manufacturing Co. 70,408
Pipes, wooden, J. Desjardins 70,365
Potato chips, cooked, C. A. Hunter 70,333
Powder, sweeping, G. W. Green 70,396
Remedy for certain diseases, Olephen Chemical Co. 70,401
Remedy for certain diseases, J. H. Stout 70,403
Rubber rings and gaskets for jar caps, Pennsylvania Rubber Co. 70,376
Safes, Herring-Hall-Marvin Safe Co. .. 70,369, 70,411
Sardines in cotton-seed oil, American, Blanchard Manufacturing and Canning Co. 70,330
Sheet metal, Worcester Pressed Steel Co. 70,407
Shoe pastes and polishes, J. M. Borland 70,331
Shoes, boots, and slippers, leather, Arcadia Co-operative Shoe Co. 70,327
Shoes, leather, H. Schwartz & Bro. 70,355
Shoes, leather and canvas, Battreall-Whittinghill Shoe Co. 70,328, 70,329
Skylights, G. Drouve Co. 70,395
Soap, Goodhair Remedy Co. 70,332
Soles for slippers, wool, D. I. Rogon 70,354
Sparking plugs, D. M. Tuttle 70,404
Starch, laundry, American Maize-Products Co. 70,386, 70,387
Stoves, furnaces, and ranges and all parts thereof, Detroit Stove Works 70,366
Tomato scalding and washing machines, J. Baker 70,322
Tonic, celery, Century Chemical Co. 70,409
Tools, certain, J. B. Hasenclever & Sohne, 70,347 to 70,350
Toothpicks, wooden, O. H. Hersey 70,370
Transom lifters, Payson Manufacturing Co. 70,375
Whisky, blended, Franc, Heyn & Co. .. 70,325, 70,326
Yarn, combed, Kilburn Mill 70,372
Yarns and threads, Dollfus-Mieg & Cie. Societe anonyme 70,360, 70,361

LABELS.

"Abbott's Aromatic Bitters," for bitters, C. W. Abbott & Co. 14,328
"Behn Hamie 'Kosher' Scouring Soap," for a scouring soap, L. Gelberg 14,330
"By Gum," for gum drops, Manierre-Yoe Syrup Co. 14,327
"Captain Burton," for cigars, Schmidt & Co. 14,320
"Carter's Tamarind Sauce," for a sauce, E. W. Carter 14,324
"Con-e-wan-go," for canned peas, Frewsburg Canning Co. 14,325
"Hand Made," for cigars, Schmidt & Co. 14,321
"Niles & Moser's Hand Made," for cigars, Niles & Moser's Cigar Co. 14,323
"Ortega Brand," for a canned preparation of chilli and tomatoes, Pioneer Green Chile Packing Co. 14,326
"Perla del Mar," for cigars, P. Garcia & Bros. 14,322
"Tekol," for a medicinal compound in tablet form, F. J. Rief 14,329

PRINTS.

"Poth's Extra," for beer, F. A. Poth & Sons. 2,324
"The Hands Can Do the Trick and Turn One Cuff into Two," for ladies' shirt-waists, Guggenheim Co. 2,326
"The Kendall Hat Protector," for hat protectors, E. A. Kendall 2,325
"The Yankee Prince," for men's suits of clothes, Eclipse Clothing Co. 2,327

A printed copy of the specification and drawing of any patent in the foregoing list, or any patent in print issued since 1863, will be furnished from this office for 10 cents, provided the name and number of the patent desired and the date be given. Address Munn & Co., 361 Broadway, New York.

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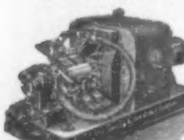

An important decision has just been rendered by Judge Cross of the Circuit Court of the United States, District of New Jersey, in favor of the Hanson & Van Winkle Co., of Newark, N. J., and Chicago, Ill., and against the United States Electro-Galvanizing Company, of Brooklyn, New York, for a new process of electro-galvanizing.

IN EQUITY ON FINAL HEARING

The Hanson & Van Winkle Co. took up this fight single handed some six years ago, and have conducted it at great expense, feeling confident of final success.

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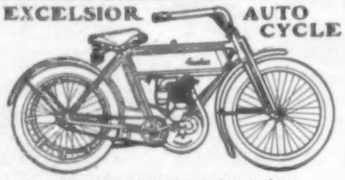

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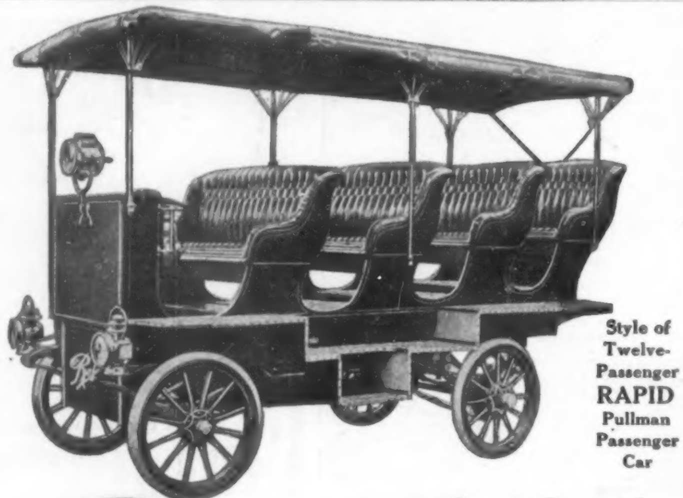

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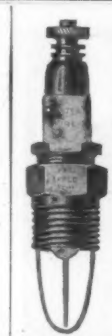

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